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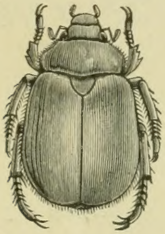

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CAN INSECTS SURVIVE FREEZING?*

BY H. H. LYMAN, MONTREAL.

In a foot note to his paper on "The Butterflies of Laggan" (CAN. ENT., XXII., 129), Mr. Bean says: "I hope none of my younger readers entertain the absurd mediæval superstition that hibernating caterpillars pass the winter in a *frozen condition*. In successful hibernation they do not get near to such a condition; but if they do absolutely freeze, then are they undone caterpillars. Valkyria gives them sleep, unmixed with dreams, and they wake in Valhalla."

Without entering into any discussion as to my relative age in comparison with Mr. Bean's, I may confess that I have long believed that *some* caterpillars, as well as insects in other stages, can and do survive freezing. And, finding my belief so distinctly challenged, I have endeavored to find some light upon this subject from such literature as is accessible to me, and from personal testimony.

The first work to which I turned was Scudder's "Butterflies of New England".

In this work there is an Excursus, No. XVII., on "Lethargy in Caterpillars", and another, No. XXII., on "The Hibernation of Caterpillars," but in neither is any light thrown upon this question.

In the same author's "Butterflies" but little more is said upon this subject. On page 135, in writing of *Colias philodice*, he says: "Winter overtakes at once caterpillars of various ages, chrysalids and butterflies, and probably eggs. The experience of breeders, and the diversity in the time of appearance of the butterflies in the spring, render it probable that the cold season kills not only the butterflies and eggs, but perhaps the chrysalids as well, leaving the caterpillars to renew the life of the species in the spring."

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* Read before the Annual Meeting of the Entomological Society of Ontario, November 25th, 1891.

But, though I have failed to gather from his works any information upon this subject, I have learned from him personally, and by letter, some facts which may be thought to throw some light upon this question. About thirty-five years ago Mr. Scudder was prodding for beetles in some hole of a rotten stump in winter at Williamstown, Mass., and came across several caterpillars of Isabella, and breaking at least one in two found it brittle, like an icicle, and he believes he noticed crystals within, and, therefore took two or three home to his room to see if they would come to life, which one or more did. Mr. Scudder, however, does not lay much weight on these facts, and adds: "I may or may not have broken more than one, and do not at all remember whether only one or all came to life, but of course I *may* have broken only one, and that one already dead."

I have recently seen somewhere, where I cannot now say, though I have spent hours in searching for the reference, an account of a caterpillar being found frozen into a cake of ice. The finder cut out a cube of the ice containing the caterpillar by means of a red-hot poker, and then left the block on the sill outside his window for several days, while the temperature ranged below zero. Upon bringing it into the house and thawing out the larva, it revived, and became quite active, but further experiment was prevented by its spinning its cocoon.

In Mr. Fletcher's report for 1889 (Fxperimental Farm Reports, 1889, p. 79), it is recorded that four larvæ of the Mediterranean Flour Moth (*Ephestia Kühniella*, Zeller) were placed in a glass vial out of doors for half an hour when the temperature was only five degrees above zero F., and as a result were frozen hard, so that they "rattled like glass beads against the sides of the bottle". Of the four, two never recovered at all, but the other two revived partially and retained their natural appearance for about a fortnight, and moved their bodies a little, though they finally succumbed. The Rev. T. W. Fyles has kindly given me the following particulars of his experience with larvæ of Coleoptera: "In the winter of 1864–5, I was splitting up decaying hemlock logs in my pasture at Iron Hill, P. Q., intending to burn them in the spring. On several occasions I found in these logs numbers of the larvæ of *Orthosoma unicolor* in a torpid state. In some cases the water had percolated into the burrows of the insects and frozen around their occupants. One day I picked out a number of the largest grubs from their icy envelopments, and found them rigid and seemingly lifeless. I took them to my house and watched them as they slowly thawed into activity."

Dr. John Hamilton, of Alleghany, Pa., on the other hand, found, as related in his interesting paper in CAN. ENT., XVII., p. 35, that he could not revive specimens of Coleoptera which were unquestionably frozen, though some larvæ inclosed in cylinders of ice were still found to be flexible, and regained activity on a rise of temperature.

Though Dr. Hamilton's experience was decidedly against the theory that actual freezing does not necessarily cause death in insects, he still admits that a good deal of evidence has been adduced on the other side, and that records of the survival of frozen insects cannot be summarily dismissed.

To turn to some of the older writers on entomology, I may quote the following from Kirby & Spence's "Introduction to Entomology", Vol. II., second edition. On page 231, after referring to some very extraordinary instances of the survival of insects under such trying circumstances as immersion in gin for twenty-four hours, and immersion in boiling water, the authors say: "Other insects are as remarkable for bearing any degree of cold. Some gnats that De Geer observed survived after the water in which they were was frozen into a solid mass of ice: and Reaumer relates many similar instances." Later, on pages 452–3 of the same volume, in treating of "Hibernation of Insects" I find the following very interesting remarks: "But, though many larvæ and pupæ are able to resist a great degree of cold, when it increases to a certain extent they yield to its intensity and become solid masses of ice. In this state we should think it impossible that they should ever revive. That an animal whose juices, muscles and whole body have been subjected to a process which splits bomb shells, and converted into an icy mass that may be snapped asunder like a piece of glass, should ever recover its vital powers, seems at first view little less than a miracle; and, if the reviviscency of the wheel animal *(Vortricella rotatoria)* and of snails, etc., after years of desiccation, had not made us familiar with similar prodigies, might have been pronounced impossible; and it is probable that many insects when thus frozen never do revive. Of the fact, however, as to several species, there is no doubt. It was first noticed by Lister, who relates that he had found caterpillars so frozen that when dropped into a glass they clinked like stones, which nevertheless revived. Reaumer, indeed, repeated this experiment without success, and found that when the larvæ of *Bombyx pityocampa*, F., were frozen into ice by a cold of 15° R. below zero (2° F. below zero), they could not be made to revive. But other trials have fully confirmed Lister's observations. My friend. Mr. Stickney, the author of a valuable 'Essay on the Grub' (larva of *Tipula oleracea*)—to ascertain the effect of cold in destroying this insect, exposed some of them to a severe frost, which congealed them into perfect masses of ice. When broken their whole interior was found to be frozen; yet several of these resumed their active powers. Bonnet had precisely the same result with the pupæ of *Papilio brassicæ*, which, by exposing to a frost of 14° R. below zero (0° F.), became lumps of ice, and yet produced butterflies. Indeed, the circumstance that animals of a much more complex organization than insects, namely, serpents and fishes, have been known to revive after being frozen, is sufficient to dispel any doubts on this head."

In Burmeister's "Manual of Entomology" the above instances are also referred to, though at much less length; but, as no additional facts are adduced, it is unnecessary to quote from his work.

The above would seem sufficient to establish the proposition that some insects can survive freezing, and, indeed, when one remembers that insects successfully maintain their existence in the most arctic lands which have ever been visited by man, it seems strange that anyone should ever have questioned it. Is it conceivable that these tiny creatures, when in a state of lethargy and partaking of no nourishment, could successfully resist yielding to frost in regions subject to a temperature of 75° F. below zero, and where in summer the soil only thaws to the depth of twelve or fifteen inches, the ground below this depth being perpetually frozen?

The meteorological tables of the English arctic expedition of 1875–6 show that the mean temperature of the winter months at the stations of the two vessels, "Alert" and "Discovery", varied from 5° F. below zero in October, and 17° F. below zero in April, to 40° F. below zero in the middle of the winter, and that the minimum temperatures reached were:—73¾° F. at the winter quarters of the first named vessel, and —70.8° F. at the station of the latter in Discovery Bay.

In spite of these terrible temperatures the naturalists attached to the expedition were very successful, and Mr. Robert McLachlan, F. R. S., to whom the collections of insects were submitted, wrote as follows in his report: "The materials brought home from between the parallels 78° and 83° N. latitude, showed quite unexpected, and in some respects astonishing results. I have no hesitation in saying that the most valuable of all the zoological collections are those belonging to the entomological section, because these latter prove the existence of a comparatively rich insect fauna, and even of several species of showy butterflies, in very high latitudes."

But the most interesting account of experiments on this subject which I have seen, is that given by Commander James Ross, R. N., F. R. S., and inserted by Curtis in the Entomological Appendix to the "Narrative" of Sir John Ross's second arctic voyage. The experiments were tried upon the caterpillars of *Laria Rossii*, a very abundant species in Boothia Felix, and doubtless all through the artic regions of this continent. The account (page lxxi.) is as follows: "About thirty of the caterpillars were put into a box in the middle of September, and after being exposed to the severe winter temperature of the next three months, they were brought into a warm cabin, where, in less than two hours, everyone of them returned to life, and continued for a whole day walking about; they were again exposed to the air at a temperature of about 40° below zero, and became immediately hard frozen; in this state they remained a week, and on being brought again into the cabin, only twenty-three came to life; these were, at the end of four hours, put out once more into the air, and again hard frozen; after another week they were brought in, when only eleven were restored to life; a fourth time they were exposed to the winter temperature, and only two returned to life on being again brought into the cabin; these two survived the winter, and in May an imperfect *Laria* was produced from one, and six flies from the other."

That a caterpillar infested with parasites should have been able to survive such severe treatment and spin its cocoon is most remarkable, and it is not to be wondered at that alternate freezing and thawing should have been disastrous to the majority of those experimented upon. Many other similar accounts doubtless exist, but I think that the records which I have thus brought together are sufficient to prove that actual freezing is not necessarily fatal to insects, and that Mr. Bean had no sufficient warrant for the statement quoted at the beginning of this article.

DESCRIPTIONS OF SOME BUTTERFLY LARVÆ FROM YOSEMITE (V.), AND THE LIFE HISTORY OF CALLIDRYAS EUBULE.

BY HARRISON G. DYAR.

Pyrameis cardui, Linn.

The life history of this well-known species has not been written, to judge from the references given by the late Mr. Henry Edwards in his useful catalogue, so I present it here :—

Egg.—Cylindric-conical, the base flat with the usual vertical ribs ; colour pale yellow ; diameter .6 mm. Laid singly.

First larval stage.—Head rounded, black and shining ; width .3 mm. Cervical shield and anal plate black ; body very blackish with a number of short dark hairs ; feet normal. The larva lives under a slight web on surface of leaf.

Second stage.—Head as before with a few hairs ; width .6 mm. Body dull black, furnished with rows of short conical blackish tubercles each with a long hair ; the tubercles of the rows (1) and (2) on joints 6, 8 and 10 are pale yellow. Hair blackish ; feet black.

Third stage.—Head slightly bilobed, black, shining, a few black hairs from minute tubercles ; width 1.1 mm. Body black, covered with spined processes arranged as in *Grapta**, all black except the three dorsal ones on joints 6, 8 and 10 which are yellow, but with black spines.

Fourth stage.—Head bilobed, uniform shining black, with many black hairs arising from elevated bases ; width 1.9 mm. Body black, minutely dotted with yellow ; processes black except the bases of the three dorsal ones on joints 6, 8 and 10, which are dark yellow. As the stage advances a very narrow geminate dorsal and single subventral broken yellow line appears. The larvæ live singly under nets constructed of silk supported on a leaf.

Fifth stage.—Head rounded, uniform sublustrous black, the mouth parts paler and bases of antennæ reddish ; covered with black hairs of considerable length, which arise from small tubercles ; width 3.5 mm. Body deep black, brownish subventrally and on the legs, with numerous minute yellow piliferous tubercles bearing whitish hairs. The shafts of the processes are all more or less colourless, but the branches and tips are all black and the bases are shining blue-black. There is a row of inter-

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* See "Descriptions of some Butterfly larvæ from Yosemite," No. VI.

segmental stigmatal red dots and a similar row of larger substigmatal yellow dots. Claspers of abdominal feet pale. In some examples the substigmatal yellow dashes almost form a continuous band, and there are indications of a geminate yellowish dorsal line ; but this latter marking almost disappears under a lens.

Chrysalis.—Head large, eyes prominent, thorax very slightly ridged along the dorsal line with an elevated point posteriorly centrally and a pair of smaller subdorsal points, two points on the lateral edge of wing cases and one near the middle of outer margin of wing. Abdomen rounded dorsally, nearly straight ventrally, with a subdorsal row of conical points ; cremaster broad and flat, colour sordid white with an obscure golden tint, dotted with black and shaded with smoky gray, broadly so dorsally (except a narrow dorsal line), narrowly stigmatally, broadly ventrally, and more irregularly and clouded over the thorax and cases. All the points tinged with shining gold or bronze. Length 13 mm.; width 6 mm.

Food-plants.—Lupine *(Lupinus)* and thistle *(Carduus).*

Callidryas eubule, Linn.

Egg.—Spindle shaped, truncated on basal end, distinctly vertically ribbed and faintly transversely striated. Colour pale white, becoming ochre yellow before hatching. Length 1 mm.; diameter .3 mm.

First larval stage.—Head round, smooth, ochre yellow, the ocelli dark brown ; width .3 mm. Body smooth, concolorous with head, with a number of long tapering setae, curving forward, about six on each joint.

Second stage.—Head rounded, subtranslucent yellowish ; width .5 mm. Body cylindrical, pale yellow, with many short hairs arising from granulations of considerable size. Some of these hairs overhang the head and many terminate in a little knob. Under the microscope the setae are seen to be all glandular, transparent and swollen at tip, and arise from large conical tubercles, between which the body is very minutely punctured.

Third stage.—Head pale green, mouth parts yellowish, many short pale setae ; width .8 mm. Body annulated, about six annulets per segment. Colour yellowish green, not shiny, with a distinct rather broad, pale green stigmatal line. The fleshy tubercles on the body are slight, the setae very short but slightly blackish and bear at tip large, round, clear liquid drops.

Fourth stage.—Head round, leaf green, mouth parts yellow; many short hairs arising from black conical granulations; width 1.5 mm. Body leaf green with a paler stigmatal line and thickly covered with black conical granulations, some of which are larger than others and surrounded by pale green, and all bear short setae. Under the microscope these granulations are seen to arise from swollen green bases and the setae each terminate in a clear spherical drop.

Fifth stage.—Head small in comparison with body, round, leaf green, thickly covered with conical granulations bearing minute setae, concolorous with head, but a few of the larger ones are blue–black; width 2.4 mm. Body cylindrical, 5 mm. thick, dark leaf green with a distinct rather broad, yellow stigmatal line strongly shaded with orange, extending the whole length of the body and bordering the anal plate. Six annulets per segment, each annulet containing some twelve conical blue-black granulations, surrounded by bluish green at the base. Only a few of these occur below the stigmatal line and then in the middle of the joints where, also, just above the stigmatal line, and sometimes partly below it, the granulations are connected by black, forming incipient transverse bands on the annulets. The granulations are each tipped by a short black seta. Feet and venter pale green, nearly smooth. The body is very minutely punctured between the granulations when seen under the microscope.

Chrysalis.—Suspended by the cremaster and a long very slight silken loop. Thorax bent up at an angle of 45° with the body, rounded, a slight depression posterior to it; a long pointed process on the head like a horn, almost continuous with the sides of the body. Wing cases enormously, developed, projecting more than the thickness of the body, evenly rounded along ventral line, flattened laterally and tapering ventrally to an edge. Abdomen cylindrical, tapering; cremaster flattened, a little excavated below. Colour dark pinkish vinaceous†, or pea-green‡, with a greenish dorsal and lateral band, bordered with pale yellow; ventral line and veins of wing-cases narrowly yellowish. Length 25 mm.; thickness through wing cases from dorsum to venter 10 mm.; thickness of abdomen posterior to cases 4 mm.; width of body 5 mm.

Food-plant.—Senna *(Cassia.)*

Larvæ from Santa Barbara, Cal.

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† Ridgway's Nomenclature of Colours, pl. iv., fig. 18.

‡ Op. Cit., pl. x., fig. 9.

REVISION OF THE BOMBYLID GENUS EPACMUS (LEPTOCHILUS).

BY D. W. COQUILLETT, LOS ANGELES, CAL.

In the CANADIAN ENTOMOLOGIST for May, 1886, I gave descriptions of the only two species of *Leptochilus* at that time known to inhabit North America. I am not aware that any additional species have been described since the appearance of that paper. My collection contains representatives of three as yet undescribed species which will be found duly characterized below.

In the *Biologia Centrali Americana*, Part Diptera, the Baron Osten Sacken calls attention to the fact that the name *Leptochilus*, first applied to this genus by Dr. Loew, is preoccupied, and proposes the name *Epacmus* to be used in its stead. It is to be regretted that the rules of nomenclature will not permit us to attach Dr. Loew's name to this new term ; the genus is rightfully his from the fact that he first characterized it after an extended search among the writings of other authors, and it seems hardly fair to deprive him of this honour simply because he inadvertently applied to it a name already in use. Perhaps we might compromise matters somewhat by writing the name of this genus : *Epacmus* Osten Sacken-Loew, which would indicate a joint work of these two authors.

Following is a table of the species of *Epacmus* known to me to occur in North America :

1. Ground colour of the abdomen black 2
   Ground colour of the abdomen yellow, its tomentum golden-yellow except a white crossband on the second segment . *concinnus*, n. sp.
2. Wings (except sometimes the costal and subcostal cells) wholly hyaline, front and face furnished with tomentum . . . 3
   Wings smoky-brown at the base, front and face destitute of tomentum 4
3. Scutellum shallowly concave behind, hind and middle femora and front tibiæ provided with bristles . . *modestus*, Lw.
   Scutellum convex behind, all femora and the front tibiæ destitute of bristles . . . . . *pellucidus*, n. sp.
4. Hind femora and front tibiæ provided with bristles, scutellum polished black . . . . *transitus*, Coq.
   Hind femora and front tibiæ destitute of bristles, scutellum opaque *fumosus*, n. sp.

Epacmus concinnus, n. sp.—Head black, front densely white pollinose, destitute of tomentum, the middle portion sparse white pilose, the orbits and space in centre of lower third of front bare; face much retreating below, densely white pollinose, destitute of tomentum, the lower three-fourths densely white pilose. Proboscis not projecting beyond the oral margin. Antennæ having the first two joints yellow, the third black and nearly twice as long as the first two united; styliform portion of the third joint one-half as long as the thickened basal part. Occiput yellowish tomentose. Thorax black, the anterior third white tomentose, the remainder yellowish tomentose; pile of thorax sparse and mostly yellowish, the bristles also yellowish; pleura dense white tomentose and sparse yellowish pilose. Scutellum opaque black, rounded behind, white and yellowish tomentose, the bristles yellowish. Abdomen reddish-yellow, its tomentum and pile golden-yellow except a wide crossband of white tomentum on the second segment; venter yellow, blackish at its base, its pile and tomentum yellowish except that at the base, which is white. Legs yellow, a black spot at base of each trochanter; tomentum and bristles of legs yellowish, hind femora each with three bristles below, ront tibiæ provided with bristles. Wings wholly hyaline. Stalk of halteres brownish-yellow, the knob sulphur yellow. Length 7 mm. San Diego county, Cal. A single female, in May.

Epacmus pellucidus, n. sp.—Black, the femora, tibiæ and base of each tarsus reddish. Front densely dark brown and yellowish-white tomentose and pilose, the pile very short; face slightly produced below, white tomentose and yellow pilose. Proboscis not projecting beyond the oral margin. Antennæ having the second joint minute and scarcely apparent; styliform portion of the third joint equal in length to the thickened basal part. Occiput white tomentose, that in the middle above reddish-brown. Thorax reddish tomentose, the bristles white (only two in number, one in front of each wing); pile and tomentum of the pleura, breast and coxæ white. Scutellum opaque, rounded behind, reddish tomentose, the pile and bristles wholly wanting. Abdomen mixed reddish and yellowish tomentose, that on the last two segments wholly white; last segment polished black, the pile on its apex golden-yellow; dorsum nearly destitute of pile, first segment toward its sides abundant white pilose; venter yellowish-white tomentose. Legs white tomentose, all femora and the front tibiæ destitute of bristles. Wings hyaline, apex of subcostal cell yellowish. Stalk of halteres dark yellow, the knob light yellowish. Length 6 mm. Los Angeles county, Cal. A single female, in June.

Epacmus fumosus, n. sp.—Black, the tibiæ largely reddish. Front black pilose, destitute of tomentum; face slightly produced below, destitute of tomentum, the pile yellow, that in the middle black. Proboscis not projecting beyond the oral margin. Antennæ having first joint twice as long as the second, styliform portion of the third joint once and a-half as long as the thickened basal part. Occiput light yellow tomentose and pilose. Thorax light yellow tomentose, the bristles yellowish; pleura having pile of the upper part yellowish, that on the lower part, breast and coxæ white. Scutellum opaque, rounded behind, yellow tomentose, the bristles reddish. Abdomen somewhat abraded in my specimen, but apparently wholly light yellow tomentose; pile of dorsum sparse, yellowish, that on the sides more abundant, especially on the first segment, white; venter white tomentose and pilose. Legs mixed white and yellow tomentose, all femora and the front tibiæ destitute of bristles. Wings hyaline at the apex, the costal cell, bases of marginal, first submarginal, first and second basal and of the anal cell smoky-brown, which colour does not have a well defined limit outwardly. Stalk of halteres dark yellow, the knob light yellow. Length 6 mm. San Diego county, Cal. A single female, in May.

HETÆRINA AMERICANA.

There was brought to me by Mr. T. H. Hill, of this city, one of our young collectors, a dragon fly captured at Delaware, a village a few miles west of here. It was one I had not seen before. On referring to Glover's Plates I found it there, figured and named. It is *Hetærina Americana*, Fab., the *Lestes basalis* of Say, in the family Agrionidæ; a beautiful creature. Its most noticeable characteristics are the bright sanguineous colour on the base of the wings, the clear copper colour of the thorax, and the brilliant gem-like ornamentation of the head. Say gives the habitats as Missouri, Indiana and Massachusetts. Abundant, and easily taken. I am not aware of its being hitherto reported from Canada. Mr. Hill kindly donated one to the Society's collection.

J. Alston Moffat, London, Ont.

CANADIAN GALLS AND THEIR OCCUPANTS—AULAX NABALI, N. S.

BY WM. BRODIE, TORONTO.

Gall at the base of the stem of *Nabalus altissimus*, usually in masses surrounding stem, often extending down on main root, rarely on main fibres of root, usually about an inch under the ground. sometimes partly above the ground. Galls roughly spherical, 5 mm.–10 mm in diameter, each containing 1-10 cells, usually aggregated in irregular cylindrical masses of 2-14, resembling small knobby artichokes or irregular small white potatoes. The interior of the gall has the appearance and consistence of a raw potato. They are mature about the middle of September, and retain their white appearance through winter, but in spring the colour darkens. They dry up when the interior presents the appearance of a congeries of corky, fibrous folds. The average size of 20 of the cylindrical gall masses was, diameter, 14xx; length, 22xx. The cells are small, closely confining the larva.

In the spring of 1880 a friend handed me one of these galls, and informed me he had found it on the stem of an aster. For several seasons I carefully searched our asters, but failed in finding the gall, and it was not until the spring of 1885 when I found it on the root of *Nabalus altissimus*. My friend had mistaken the nude, dry stem of the nabalus for an aster.

In April, 1887, I made a collection of 33 gall masses from *Nabalus altissimus* growing on clay banks in open woods in St. James's Cemetery, Toronto.

The galls were at the base of the stem, immediately above root. Usually the mass of galls surrounded the stem; occasionally but a few on one side. From these galls I reared 115 producers—79 ♀s, 36 ♂s, and 57 parasites, ♂s and ♀s, of two species.

The producers came out 1-6-87—9-6-87; the parasites were a few days later.

A collection was made from *Nabalus* roots growing on clay soil in open woods a few miles north of Toronto, 20-10-88, and kept in a glass jar over winter. These galls were nearly spherical, 5x-10x dia., usually grown together in masses of 2-14. usually quite surrounding the stem, each nodule having from 1-10 cells.

These gave producers 17-5-89—28 5-89; parasites 21-5-89—1-6-89.

A collection of 71 gall masses made in Taylor's woods north of Toronto, 13-9-90, resembled artichokes or small white potatoes; the interior white, about the consistency of raw potato. Each nodule contained from 1-3 cells; cells small, closely confining larva.

These gave producers 13-5-91—20-5-91; parasites 19-5-91—1-6-91. ♀ producers were more numerous than ♂s.

A collection made from several localities near Toronto from stems of *Nabalus altissimus* growing on clay soil in open woods, 5-4-91, of 87 nabalus stems gathered 68 were gall bearing. The galls, as usual, a mass of rounded nodules surrounding base of stem an inch or two under ground; occasionally a few nodules on one side of stem, rarely a few nodules extend into pith canal.

These gave parasites, *Eurytoma*, 5-5-91; producers first out 12-5-91; producers, 29 ♀s and 5 ♂s; out, 25-5-91; numerous parasites 9-6-91—25-6-91. One *Eurytoma* 22-7-91.

This lot of 68 gall masses containing probably 1,000 cells, gave of producers 153 ♀s and 81 ♂s, and of parasites, of 3 species, 185 ♂s and ♀s, a total of 419 specimens.

When collected in the fall season these galls may be kept in moist sand in a glass jar, but the occupants seem to be hardy, and do not appear to be injured by the drying of the gall. However, it is best to collect in April or early in May.

These galls have been increasing during the last ten years, and have now probably reached a maximum. The parasites are now becoming more numerous. The producer is held to be an undescribed species of *Aulax*, for which I propose the name *A. nabali.*

The following is a description:—

♀. Length 2.50xx. Antennæ 13 jointed, uniform brown, head and thorax black, abdomen shining brown, with a large anterior dorsal spot black; all the tibiæ, femora and tarsi brown, a little paler than the abdomen; wings ample, veins well defined, hyaline, irridescent at certain angles.

Abdomen of ♂ darker brown, and without the dark dorsal spot. From numerous specimens.

I have bred from this gall numerous specimens of the Braconid *Dacnusa crassitela*, Prov.

Provancher in his original description of this species gives Ottawa as the locality and Guignard as the collector. He does not say how the specimen was obtained, nor does he say anything of the ♂, which differs considerably from the ♀.

I have also bred numerous specimens of the Chalcid *Eurytoma aulacis*, Ashm.; and I have reared two species of Coleoptera, probably accidental occupants, and many specimens of a Dipteron which Prof. Riley has kindly determined for me as of the genus Leucopis, sp. I am greatly indebted to the courtesy of Prof. Riley for this and many other identifications.

ENTOMOLOGY FOR BEGINNERS—No. 1.

NOTES ON KILLING, PRESERVING AND RELAXING INSECTS.

BY JAMES FLETCHER, OTTAWA.

The editor informs me that he wishes to publish in this year's volume of the Canadian Entomologist several short articles for the benefit of beginners and many others, who, although they do not aspire to being considered entomologists, yet would like to know something about our common insects, and the best way to preserve such interesting specimens as may chance to come in their way, until they may have an opportunity of mounting them for their own collections or giving them to interested friends. I have been asked to send some notes on the above subject.

There is perhaps no statement more frequently made to entomologists by observant travellers, or those who live in localities far removed from civilization, than " Oh ! I wish you had been with me, I so often saw lovely insects ; but I did not know how to save them for you." From novices the enquiry often comes, " What is the best way to relax specimens after they have become dry."

Killing and Preserving.—Having collected a specimen the first thing, of course, is to kill it. For beetles and hard-bodied insects nothing is simpler than to drop them for a second or two into scalding water ; they must be taken out again at once and dried on blotting paper, or upon a cloth. The easiest way, however, for killing all insects is to make a " cyanide bottle." This may be made either by placing a small quantity of cyanide of potassium in the bottom of a wide-mouthed bottle and pouring in sufficient wet plaster-of-paris to cover it ; or a hole can be hollowed out in the cork and a piece of cyanide inserted. This can be kept in place either with a plug of cotton wool, or a piece of chamois leather or linen may be tied over the cork. It must be remembered that the active principle of cyanide of potassium being prussic acid it is intensely poisonous—any left on hand after the bottle is made should be at once destroyed.

Insects put in this bottle will be killed in a few seconds by the poisonous fumes given off by the cyanide of potassium; they should then be taken out and packed away whilst soft and pliable. After a few days they become dry and are very easily broken. If there are only one or two specimens these may be wrapped in soft paper or cotton wool, and put away in a suitable box. If the collector, however, is likely to get several specimens, it will be well to prepare a box or bottle on purpose. Beetles or bugs may be preserved for a long time in clean saw-dust dampened with alcohol; grasshoppers, ants, wasps, bees, flies, etc., although they are far better preserved by being pinned at once after killing, may be packed away like beetles and bugs in tubes of paper. These are made by winding two or three thicknesses of a strip of paper 1½ inches wide around a lead pencil, leaving about one-quarter inch over the end, which is turned in and pressed flat before taking the case off the pencil. Into this short, hollow tube drop the specimens and turn in the other end with the tip of a pencil, or fill up the mouth with a plug of cotton wool. Several specimens, according to their size, may be placed in each tube, and the date and locality having been written on the outside they are ready to be packed away in a dry place. Being slightly elastic and very light they pack closely, and a large number can be sent by mail at the same time.

Moths, butterflies and dragon-flies may be killed in the ordinary "cyanide bottle," and then placed in three-cornered envelopes made by taking small squares of paper and folding them across, almost in the middle, so as to make a triangular form with one flap a little smaller than the other, when the insect is placed between the two flaps, the two edges of the larger one are folded over the lesser, and the specimen is then ready to have the date and locality written on it and to be packed away where it will not be disturbed.

Relaxing.—The easiest way to soften insects is simply to place them in a covered jar upon damp sand for from 12 to 24 hours. A few drops of camphorated spirits dropped on the sand will prevent mould from forming on the specimens. Pinned specimens can be either placed in the sand jar or pinned upon a piece of cork and floated on water in a closed jar, or in a basin with a damp towel over the top. Butterflies and moths stored in the envelopes mentioned above are best relaxed by putting the envelopes carefully without opening them, between the folds of a damp towel placed between two sheets of glass. The cloth should be wetted and then wrung out as dry as possible with the hands. Fold it smoothly and spread out the envelopes separately between the folds. Small butterflies and moths will relax in 12 hours and the largest in 24 hours. Beetles and bugs in paper tubes may be dropped into warm water and will be ready for setting in a few minutes ; wasps, bees and flies should be placed in the sand jar to soften. Mr. W. H. Harrington, who uses these tubes extensively for all kinds of insects, finds that specimens can be conveniently relaxed by putting the tubes on a piece of wet blotting paper in the bottom of one saucer with another inverted over the top. The advantage of this plan is that if specimens should be accidentally forgotten, or it should be inconvenient to mount them at once, the small amount of moisture soon evaporates, and there is no danger of mould.

"BUTTERFLIES THAT BATHE."

In Goldthwaite's Geogl. Mag., Vol. 2, p. 738 (Nov., 1891), is a paper on "Butterflies that Bathe", giving observations of M. G. Lyell, jr., in Australia, on certain butterflies, species not stated, that "backed into the water until the whole of the body and the lower part of the hind legs were under water, the two forelegs only retaining their hold on dry land. After remaining in this position something like half a minute it flies away, apparently refreshed. During the morning I noticed a number doing the same thing. In one instance no less than four were to be seen within a space of not more than three yards * * *. While in the water the fluttering of the wings was suspended, and so intent were the butterflies in the enjoyment of the cold bath that they could hardly move, even when actually touched by the net * * *. Immediately upon emerging they flew up again to the hill sides." I do not know where this was originally published. Mr. W. G. Wright sent me the copy of the Geog. Mag., and remarked that it was a case of depositing eggs on plants in the water, and that the larvæ must be aquatic in their habits. I think there can be no doubt of that. Further observations on this butterfly would be welcome, and lepidopterists would be glad to know what genus and species has so unusual a habit.

W. H. Edwards, Coalburgh, W. Va.

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ENTOMOLOGY FOR BEGINNERS—No. 2.

THE NORTHERN MOLE-CRICKET (*Gryllotalpa borealis*, BURM.)

BY JAMES FLETCHER, OTTAWA, ONT.

Anyone finding the strange-looking insect shown at fig. 1 will at once recognize it as the Northern Mole cricket. It is apparently an uncommon insect in Canada, and it is partly to ascertain from the readers of the CANADIAN ENTOMOLOGIST whether or not this is the case that I am writing these notes upon a specimen which I have had in confinement for some months. I have been trying for years to get living specimens, but only succeeded last autumn when I had a fine female sent to me by Mr. W. W. Hilborn, who had caught it in his garden at Leamington, in Essex County, Ont. A short time afterwards I received from the same locality, from Mr. G. H. Mills, a male, but this was unfortunately injured in transit and died the day after arrival. There is to my mind nothing more interesting than keeping insects alive and watching their habits. This, too, after a little experience, becomes an easy matter if their habits are considered. I cannot, however, say that my Mole-cricket has been a very entertaining pet owing to its subterranean and nocturnal habits. I prepared a home for it in a large glass jar, 8 inches in diameter, and filled to the depth of about a foot with light, rich, sandy loam. Upon this was placed a potato and a small sod of lawn grass. The potato and grass soon threw out vigorous roots which now reach to the bottom of the jar. In the soil were also placed some earth-worms, as the food of Mole-crickets (like that of the other members of the *Gryllidæ*, or crickets to which it belongs) is of a mixed nature, and they are said to be particularly partial to earthworms.

The name Mole-cricket is very appropriate for this insect, it is plainly a cricket, and at the same time its habits and even general appearance, but particularly the form and uses of its strong fore-legs, closely resemble those of the little mammal from which it takes its name. Our excellent

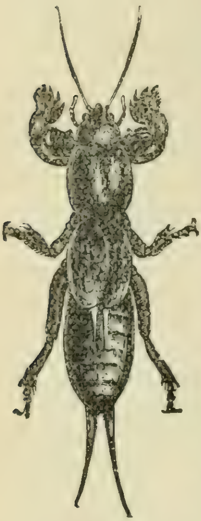

FIG. 1.

figure, which has been kindly lent by Prof. J. A. Lintner, shows the female natural size. The sexes differ very little. The male is slightly smaller. Westwood says :—" Indeed, as the females are destitute of an exserted ovipositor, it is only by a minute inspection of the veins of the wing covers that the sexes may be distinguished. The females in this family are not able to make a noise, the veins of their wing covers being more regularly disposed. The males are, morever, distinguished by having eight ventral segments in the abdomen, whilst there are only seven in the females." (Mod. Class. I, 443). There is only one species of Mole-cricket recorded from Canada. It is of the form shown above, of velvety seal-brown colour, which is darkest on the thorax. The wing covers are greyish, with dark veins, and the true wings are white and folded together like a fan. They are much larger than would be imagined from their small tail-like tips, which show beyond the wing covers on the back. The most remarkable feature of these insects is the strong fore-legs, with their expanded paw-like shanks, which bear four claw-like curved and hollowed projections at the lower edge ; two of these are jointed at the base, and are in fact claws. The feet consist of three joints, which are attached about the middle of what, by the shanks being twisted obliquely outwards, is now the outside instead of the lower side. They consist of three joints : the first and second are large and claw-like, the second the smaller but reaching almost as far as the tip of the first ; the third is very small indeed, and bears two weak true claws. The first two tarsal joints being of the shape described give great strength to the insect's " paw " when used for digging, for they lie right in front of the two articulated projections of the shank which fit closely to them, and the weak terminal joint lies between. The adaptability of these limbs for their required use is at once seen by the rapidity with which these insects dig down out of sight again when disturbed.

As stated above, Mole-crickets are nocturnal in their habits. They live in moist ground and near streams, where they sink their burrows some inches beneath the surface ; but also throw up little ridges as they burrow nearer the surface, like miniature mole-runs.

They have not the power of jumping highly developed like other crickets, but can swim with ease if they fall into water. Their little shining black eyes, velvety coats and flexible bodies recall strongly the appearance of the otter, particularly when emerging from the water or crawling over stones. On the whole these interesting creatures are the most mammal-like insects I have ever seen. They keep in their burrows the greater part of the time. and I have only been able to catch sight of my specimen by going in quickly at night with a light. They move backwards with almost as great ease as forwards, the two caudal bristles being evidently very sensitive, for which reason they were designated caudal antennæ by one writer. The song of the male is described as "a low, continued, rather pleasant trill, quite similar to that of the common toad, but more shrill."

In Europe the Mole-cricket is described as being very injurious in certain localities from eating the young roots of plants and burrowing amongst the roots. There seems to be as much controversy, however. with regard to it as there is amongst farmers as to whether the mole is an injurious animal or not. Dr. Ritzema Bos says those who think that the Mole cricket is only injurious by burrowing beneath plants make a great mistake. The methods suggested for destroying it, should it at any time occur in large numbers, are the destruction of the eggs, which are laid to the number of from 200 to 400, in chambers about six inches beneath the surface of the ground. or killing the adults by means of poisoned baits. as grated carrot or potato mixed with arsenical substances.

Dr. Lintner says, Rep. VI., p. 151: "A method recommended by Kollar and approved by Curtis, as probably the best where the insect abounds. is to dig pits in the ground in the autumn, of a foot in diameter and two or three feet deep, to be filled with horse-dung and covered with earth. At the first frost all the crickets will be attracted to and congregate in these pits for warmth, where they can be conveniently killed." I shall be glad to hear from any reader of the ENTOMOLOGIST who may find this insect in his neighborhood, and also for any definite information concerning the food and habits. My jar is well filled with roots. and I frequently put a piece of raw meat on the surface of the ground, but I cannot say that I have ever seen that either it or the roots were much eaten. The ground is burrowed in every direction by clean burrows about as large as an ordinary lead pencil, and the Mole-cricket may sometimes be seen at night moving about in these burrows apparently in good health and quite at home.

TWO NEW ORTHOPTERA FROM INDIANA.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

LOCUSTIDAE—XIPHIDIUM. Serville.

Xiphidium Scudderi, nov. sp.

Female.—Front and sides of head and body dark reddish-brown; vertex, disk of pronotum and tegmina greenish-brown in life, (dull yellow after immersion in alcohol). A dark reddish-brown stripe extends from the front extremity of the fastigium to the posterior border of pronotum, and contrasts strongly with the general colour of vertex and disk of pronotum. Femora greenish-brown punctate with many dark brown impressions on their upper surface; the tibiæ darker. Antennæ with the basal third reddish, the remainder fuscous.

The apex between the eyes rather broad, with the sides rounded; the cone projecting strongly upward and forward and much more prominent, though narrower, than in *X. strictum*, Scudder.

The tegmina cover two-thirds of abdomen; the wings are shorter, reaching to middle of abdomen. Ovipositor of excessive length, almost twice as long as body; slender, and nearly straight until near the apex, where it is curved slightly upward. The posterior femora and tibiæ are also longer and more slender than is usual with members of the genus.

Measurements: ♀, length of body, 18 mm.; of antennæ, 52 mm.; of tegmina, 9.5 mm.; of wings, 7 mm.; of posterior femora, 16 mm.; of posterior tibiæ, 16 mm.; of ovipositor, 30 mm.

A dozen or more females of this striking species were taken from the margins of a large pond in Vigo County, Ind., on October 11th, 1891. Although in company with *Xiphidium strictum*, Scudder, and *X. brevipenne*, Scudder, yet it was at once noticeable on account of its dark glossy-brown colour and exceedingly long ovipositor. Careful search was made for the males, both then and two weeks later, when the pond was again visited, but none were found, and on the latter visit but one female was seen. Those taken were on the stems of the partially fallen rushes and sedges which filled the margins of the pond. When disturbed they gave two or three enormous leaps, and then moving rapidly for some little distance would endeavor to hide beneath the mass of fallen vegetation.

Since the above was in MSS., Mr. S. H. Scudder, in whose honour the species is named, and to whom specimens were sent, suggests that

McNeill's *Xiphidium sp. ?*, mentioned in PSYCHE, VI, 24, as being deformed and having the ovipositor two and a-half times as long as the body, may have been this species.

GRYLLIDAE—APITHES = (HAPITHUS), Uhler.

Apithes McNeilli, nov. sp.

Female.—Front margin of pronotum of same width (3.5 mm.) as head, slightly incurved; posterior margin but little broader, truncate. Tegmina slightly exceeding the abdomen, entire at the tip, the dorsal field the longer. Wings extending 2.5 mm beyond the tip of tegmina. Posterior femora stoutish, exceeding the abdomen. Posterior tibiæ of same length as the femora, armed with two slightly divergent rows of spines on lower face—eight on the inner margin and five on the outer, besides the three at the apex on either side, the middle one of which is twice as long as any of the others. Between each two of the larger spines in the outer row are two small ones, about one-fourth the length of the large ones. The basal joint of tarsus has also a row of five spines on either margin of its lower face, the apical pair of which are much the longer.

The top of head, disk of pronotum, and the tegmina, are covered with a fine soft pubescence, visible only with the hand lens. All the tibiæ and upper and lower borders of posterior femora more coarsely pubescent with yellow hairs.

General colour, after immersion in alcohol, a dull brownish-yellow. A dark brown stripe reaches from eye to posterior border of pronotum. The tegmina with a small brown spot at their base, and the vein separating the dorsal from the lateral field with a number of oblong dark spots; the cross-veinlets are also much darker than the ones running lengthwise, giving the dorsal field a checkered appearance. All the femora are rather thickly marked with small dark spots, those on the posterior pair being arranged in regular rows. Extreme tip of ovipositor black.

Length of body, 16 mm.; of antennæ, 42 mm.: of tegmina, 14.5 mm.; of posterior femora, 9 mm.; of ovipositor, 12 mm.

A single female, the type specimen, was taken October 21st, 1891, from the lower leaves of a golden rod, *Solidago latifolia*, L., which grew in a thick upland woods in Vigo County, Ind.

I have named the species in honour of Prof. Jerome McNeill, of Fayetteville, Arkansas, a well-known writer on Orthoptera, and my first instructor in entomology.

SOME INDIANA ACRIDIDÆ.—II.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

Since my first paper on "Indiana Acrididæ," which was published in the ENTOMOLOGIST for April and May, 1891, was prepared, six additional species have been taken in Vigo County. Of these, one is new to science; a second has been known in the United States only from Florida and North Carolina; of a third, but one specimen, a female, has hitherto been recorded, and from it Dr. Thomas described the species; while a fourth has not before been taken west of New Jersey. With the habits and local distribution, as far as noted, of these six species, together with the description of three of them, the present paper deals.

The following works may be added to the list given in the preceding paper to which the synonymy refers:—

Comstock, J. H.—An Introduction to Entomology, I., 1888.

Fernald, C. H.—The Orthoptera of New England, 1888.

McNeill, Jerome—"A List of the Orthoptera of Illinois" in Psyche, April and May, 1891.

Scudder, S. H.—Boston Journal of Natural History, VII., No. III., 1862.

Thomas, Cyrus H.—In "U. S. Geological Survey of Montana and Adjacent Territory," 1871.

ACRIDIDÆ.

ACRIDINÆ.

TRUXALINI.

1. LEPTYSMA MARGINICOLLIS, Serville.

Opomala marginicollis, Thomas, Syn. Acrid. N. A., 1873, 66, 196, 250 (note).

Leptysma marginicollis, Scudder, Proceed. Bost. Soc. Nat. Hist., XIX., 1877, 87.

Leptysma marginicolle, Comstock, Introduction to Entomology, I., 1888, 111, fig. 102.

On October 11th, and again on the 24th, a number of specimens of this slender-bodied, graceful species were taken from the tall sedges and rushes which grew near the margin of a large pond in the river bottom of the southern part of Vigo Co. Its range has heretofore been supposed to be a strictly southern one, and Thomas, in the note, loc. cit., states that it is doubtful if it really belongs to the U. S. fauna. Mr. S. H. Scudder has, however, since recorded it from Florida, and in a personal letter says that it has also been taken in North Carolina, but not farther north.

Its occurrence in numbers as far north as Central Indiana is therefore worthy of record, and can only be accounted for by the presence of the broad and sheltering valley of the Wabash, within the confines of which it finds a climate and vegetation congenial to its taste.

If its habits be the same elsewhere as in Indiana, the name "grasshopper" is for it a misnomer, for here it is never seen on the grass or ground, and never hops when disturbed, but moves with a quick and noiseless flight for twenty or more feet, to a stem of sedge or rush, on which it alights. The instant it grasps the stem it dodges quickly around to the side opposite the intruder. Then, holding the stem firmly with its short front and middle legs, it draws its slender hind femora close up against the body, and folding the tibiae into position, hugs its support as closely as possible, and remains perfectly motionless. Its body is almost cylindrical, and being of the same general colour as the stalk of the plant on which it rests, it is almost impossible to detect it, unless one sees exactly where it alights. Eight times out of ten a person by approaching quietly can reach his hand about the plant stem and grasp the insect. Its habits excellently illustrate the so-called "protective mimicry" of form and colouring, as it always seems to choose a cylindrical object, and one similar to its own colour before alighting.

As the description given by Thomas, loc. cit., is the only one in American works of reference, and, moreover, is a very short and poor one, I append the following drawn from fresh specimens, and hope that collectors throughout the Northern States will be on the lookout for this interesting and peculiar species :—

Body very slender, sub-cylindrical. Antennæ short, somewhat ensiform. Vertex extending far forward in the form of an equilateral triangle, slightly sulcate on its anterior half. Face very oblique, median carina weak, narrowly sulcate for its entire length ; lateral carinæ slight and straight. Pronotum almost cylindrical, slightly divergent on posterior half ; median carina present, distinct only on posterior lobe ; lateral carinæ obsolete. Prosternal spine short and rounded. Face, vertex, occiput, and disk and sides of pronotum densely punctured. Tegmina exceeding the abdomen by 3 to 5 mm. Wings equal to tegmina in male, slightly shorter in female. Posterior femora very slender, not reaching tip of abdomen. Anal cerci of male slender, tapering, and bent abruptly upward and forward near the base. Sub anal plate narrow, upturned and tapering to a point.

The ground colour is a fawn, unbroken except by a narrow, yellowish stripe, extending from the hind border of eye, along the lower edge of pronotum to coxa of hind leg In living specimens this line is bordered above by one of dark brown. When the insect is dried the brown fades and the tips of tegmina become darker. Length of body to tip of tegmina, male, 30 mm.; female, 37 mm., of antennæ, male, 8 mm.; female, 6 mm.; of tegmina, male, 20 mm., female, 26 mm.; of posterior femora, male, 14 mm., female, 17.5 mm.

OEDIPODINI.

2. SPHARAGEMON BOLLI, Scudder.

Spharagemon bolli, Scudd., Proceed. Bost. Soc. Nat. Hist., XVII., 1875, 469.
McNeill, "Orthop. of Ill.," Psyche, VI., 1891, 64.

Dissosteira bolli, Fern., Orth. of N. Eng., 1888, 43.

This species is much less common than *S. balteatum*, Scudd., but three specimens having been secured. It may be readily known from *balteatum* by the higher crest of the pronotum, by the general colour being darker, the bands across the tegmina more distinct, and by having the tip of wing as black as the median arcuate band. It frequents high, dry woods, and moves with a quick, almost noiseless flight, but is clumsy as a hopper.

Sept. 1st, Oct. 17th, in copulation.

ACRIDINI.

3. MELANOPLUS GRISEUS, Thomas.

Caloptenus griseus, Thos., Geol. Surv. Terr., 1871, 454.
Id., Syn. Acrid. N. A., 1873, 165.

A single ♂ of this handsome *Melanoplus* was taken in Putnam County, on August 25th. It hopped across a roadway in the woods in company with numerous specimens of *M. femur-rubrum*, and was at once detected on account of its peculiar coloration.

On October 17th, a ♂ and ♀ were taken from near the base of trees in a high woodland pasture in Vigo County, and again on November 15th a single female was found in a similar locality.

These four are all that I have ever seen. No one of them took to flight, and their movements on the ground were exceedingly clumsy, they being easily captured with the hand. As Thomas, loc. cit., described the species from a single ♀ taken in Ohio, and as I can find no reference to the species other than those cited above, I add the following description of the ♂, drawn from a fresh specimen, together with accurate measurements of both sexes.

The length of *M. femur-rubrum* but thicker bodied. Head rather large with the occiput elevated; eyes prominent. Vertex very narrow between the eyes; the fastigium deeply sulcate; foveola present but minute, their outline circular. Frontal ridge rather broad, sulcate at the ocellus, convex between the antennæ, punctate with black depressions along each margin for its full length. Lateral carinæ prominent, but little divergent. Pronotum nearly uniform in width, expanding slightly posteriorly; the median carina distinct only on the posterior lobe, and deeply cut by the three transverse sulci; posterior lobe punctate with dark impressions. Tegmina extending 5 mm. beyond the tip of abdomen; wings but little shorter. The terminal ventral segment turned up, narrow, acuminate, entire. The anal cerci are strongly bent upward near their middle, and bear on their lower edge a broad, triangular, wing-like expansion, the apex of which is opposite the bend.

Colour.—Face, occiput, and disk of pronotum a grayish-lilac with numerous fleckings of sooty black. A broad stripe of black starts from the eye and extends back along the upper side of pronotum to the posterior transverse sulcus. Tegmina grayish-olive, marked regularly over almost their entire surface with subquadrate fuscous spots which are much larger than those possessed by *femur-rubrum*. Wings transparent, tinged with pale yellow on basal third, the veins of apical fourth fuliginous. Three bands of black cross each femur and are alternated with bands of grayish-blue of the same width. Posterior tibiæ with the basal third red, the remainder gray with black spines; knees black; venter pale yellow, (alcohol changes the black to a reddish-brown, and the grayish hues to a dull yellow). Dimensions:—Length of body, ♂ 24 mm., ♀ 27 mm.; of tegmina, ♂ 20 mm., ♀ 22 mm.; of antennæ, ♂ 11 mm., ♀ 12 mm.; of posterior femora, ♂ 14 mm., ♀ 15 mm.

The peculiar mottled appearance, and the broad expansion of the anal cerci of the ♂, serve to distinguish this species from all other *Melanopli* of the E. U. S.

4. PEZOTETTIX HOOSIERI, nov. sp.

Antennæ of ♂ very long, exceeding the length of posterior femora. Vertex between the eyes narrow, scarcely as broad as the basal joint of antennæ, (broader in the ♀), expanding and prominent in front of the eyes where it is broadly but shallowly sulcate; foveola about twice as long as wide, slightly narrowed in front, more prominent in the ♀. Frontal ridge rather broad, regular, scarcely if at all sulcate below the ocellus;

lateral carinæ well developed, but little divergent. Pronotum broadening slightly on posterior half, (more noticeable in the ♀); median carina distinct and equal throughout, the transverse sulci scarcely noticeable in the ♀, distinct but shallow in the ♂; the lateral carinæ present but rounded obtusely off; the disk and sides of posterior lobe densely and rather coarsely punctate. Tegmina oblong, two and a-half times as long as broad, reaching to middle of abdomen and slightly over-lapping on the median dorsal line, the wings but little shorter. Last ventral segment of the abdomen of ♂ broader than high, tumid posteriorly, the lateral edges higher and flaring slightly outwards. Cerci long and slender, gently incurved, narrowed at the middle, with the apical third flattened and slightly hollowed on the exterior face.

Colour of living specimens:—Male—Antennæ rufous, infuscated at tip, and with the apical sixth of each segment yellowish. Face green, clypeus and mouth parts yellow. Vertex, disk of pronotum and tegmina plain olive, immaculate. Lateral lobes of pronotum greenish-yellow below; above with a broad, shining, black line reaching from the eye to their posterior edge. The venter pale yellow, and the meta-pleural episterna with an oblique yellow line. Femora green; knees black; posterior tibiæ greenish, rufous at base, with black spines.

Female—Duller; the disk of pronotum and tegmina sometimes with minute fuscous spots; a black stripe on the sides of abdomen, above which are numerous small black blotches.

Measurements:—Length of body, ♂ 22 mm., ♀ 31 mm.; of antennæ, ♂ 15 mm., ♀ 11 mm.; of tegmina, ♂ 10 mm., ♀ 13 mm.; of hind femora, ♂ 14 mm., ♀ 17.5 mm. 13 ♂'s, 11 ♀'s.

About the margin of the pond above mentioned, this Pezotettix was found in numbers on October 17th. It was at once noticeable on account of the length of the male antennæ, and the black stripes on the sides of the abdomen of the female. The pond was almost dry, and the dense growth of sedges and rushes which had filled its shallow margins, were, in some places, burned away. Over the burned spots had sprung up a dense green vegetation, and here this Pezotettix flourished in company with *Truxalis brevicornis* and *Chrysochraon viridis*, while a few feet away *Leptysma marginicollis* found a suitable home amongst the rushes and sedges still standing.

Both sexes of *P. hoosieri* were very active, leaping vigorously when approached, and difficult to capture except by throwing the net over them as they rested on the ground. The females were exceedingly difficult to kill in the cyanide bottle, "coming to" after having been kept in it for several hours, although the males and the other insects above mentioned were killed in a few minutes. On Oct. 27th the spot was again visited, and, although several heavy frosts had occurred, yet the species was still fairly common. At this time, however, they were all found in the small patches of grass which grew among the fallen leaves a few yards from the edges of the pond proper.

TETTIGINÆ.

5. BATRACHIDEA CARINATA, Scudder.

Batrachidea carinata, Scudd, Bost. Jour. Nat. Hist., VII., 1862, 479.
Thos. Syn. Acrid. N. A., 1873, 190.
Fernald, Orth. N. E., 1888, 49.
Tettix cristatus, McNeill, Psyche, May, 1891, 77.

Two males of this species were taken, in company with numerous young and adults of *B. cristata*, Harris, from a grassy hillside on April 1st, 1891. Although Bolivar, according to McNeill, has made *carinata* a synonym of *cristata*, yet, in my opinion, the two are as distinct as are the two common species of *Tettigidea*. *Carinata* has the pronotum extending 3 mm., and the wings 4 mm. beyond the tip of abdomen, whereas *cristata* has the pronotum of the same length as the abdomen and the wings lacking 2 mm. of reaching its tip. Moreover, the median crest of the pronotum is not so prominent nor so strongly arched in *carinata* as in *cristata*. Length of pronotum of *cristata*, ♂ 7 mm.; of *carinata*, ♂ 9.5 mm. *Carinata* has not before been reported west of New Jersey.

6. TETTIX CUCULLATUS, Burm.

Tettix cucullata, Scudd., Bost. Jour. Nat. Hist., VII., 1862, 475.
Thos., Syn. Acrid. N. A., 1873, 185.
Tettix cucullatus, Fernald, Orth. N. E., 1888, 47.
McNeill, Psyche, VI., 1891, 77.

Several half-grown young and two adults of this species were taken on April 1st, and on Sept. 15th a large number of adults were secured. It appears to be widely distributed over the Eastern U. S., its occurrence having been observed from New England to Sherman, Texas, at which latter locality I took a number of specimens on July 11th. It is evidently a water-loving species, as those taken in Texas, and most of those secured in Indiana, were found along the damp, sandy or muddy margins of small streams, in company with *Galgulus oculatus*, a common Hemipteron, which abounds in like situations. *Cucullatus*, when disturbed, has a more prolonged flight than any other of our *Tettiginæ*.

The life-history of the "grouse locusts" is, as yet, very imperfectly known. In the proper localities mature specimens of most of the six species so far noted in Indiana can be taken almost any day in the year. *Tettix ornata*, Say, and *Tettigidea polymorpha*, Burm, were found in copulation on April 18th, and the latter species again on May 31st; while, as noted above, the half-grown young of two species were collected on April 1st.

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No. 18, *Pezotettix viridipes?* Walsh, Mss., of my first paper, is *Pezotettix viridulus*, Walsh, as I have since determined by comparison with specimens of the latter taken by Prof. McNeill at Moline, Ill. It was the third full-grown species, other than *Tettiginæ* taken last season, having been preceded by *Chortophaga viridifasciata*, De Geer, Apr. 26th, and *Arphia sulphureus*, Fab., May 20th. Two mature males of *P. viridulus* were taken on May 30th, and others were found at intervals throughout June, but it is by no means a common species in this locality.

FURTHER NOTES ON GELECHIA GALLÆDIPLOPAPPI, AND DESCRIPTION OF A NEW SPECIES OF BRACON.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

In a paper entitled "A Day in the Woods," I brought under the notice of the Entomological Society of Ontario, at its annual meeting held in London, on the 27th of August, 1890, the galls formed by *G. gallædiplopappi*, and gave an account of the chrysalis and perfect insect. I also alluded to two kinds of parasites preying upon the species. The description of the moth was reproduced in the December number of the Canadian Entomologist of that year (Vol. XXII., p. 248).

The insect has again come under my observation, and I am able to furnish these further particulars concerning it :—

The larva of the species when full grown is four lines in length. Its colour is light seal-brown, and it has a dorsal line of darker brown, and a few dark patches on the three last segments. Its head is black. There are a few bristles on the head and along the sides. It assumes the chrysalis form in the beginning of July.

The moths continue to appear from the 1st of August to the close of the month.

At least three kinds of parasites molest the species :—

1. *Pimpla pterelis*, Say, which, in August, issues in its perfect state from the chrysalis of the moth. (See 22nd Ann. Rep., Ent. Soc. of Ont., p. 18). This species was identified for me by Mr. Harrington.

2. An insect which, in its larval condition, leaves the chrysalis of the moth about the 10th of July, The larva is nearly four lines in length, and is white with a tinge of pink. It spins a white cocoon within the gall. I have two or three of the cocoons, and hope to obtain the perfect insects in due course.

3. A Bracon.—The larvæ of this, numbering from four to ten in a batch, consume the remains of their host at the end of July, and then spin their light drab cocoons in a cluster at the bottom of the gall. The flies appear about the 10th of April.

The perfect insect has the head and thorax black. The abdomen, which is somewhat spindle-shaped, and is attenuated at the junction with the thorax, is honey-yellow, with a brown patch on the upper part of each segment—in some instances the upper part of each segment is entirely suffused with brown. The mouth organs are honey-yellow, and the legs, with the exception of the tarsi of the hindmost pair, which are light brown, are of the same colour. The ovipositor of the female is longer than the abdomen. Its sheath is blunt, hairy and black at the tip, and does not divide in drying.

I cannot learn that this insect has hitherto been described or named. I would therefore suggest for it the appellation *Bracon furtivus*.

NOTES ON THE LIFE-HISTORY OF AGALLIA SANGUINOLENTA, PROV.*

BY HERBERT OSBORN AND H. A. GOSSARD, AMES, IOWA.

This leaf-hopper is considered a clover pest, but is also known to feed on beets, rutabagas, cabbages and blue grass. It is active even in midwinter on sunshiny days. The eggs are thrust beneath the epidermis of the food-plant, and the first brood of larvæ appears from the middle of May until July 1st. The earliest individuals of the brood are nearly mature by the first of July and are supposed to begin egg-laying a little later. Larvæ can be found in all stages of growth from this time until the advent of winter, but most of the individuals are believed to be included in two broods.

ON THE ORTHOPTEROUS FAUNA OF IOWA.*

BY HERBERT OSBORN, AMES, IOWA.

The Preliminary List of the Orthoptera of Iowa, published by Prof. C. E. Bessey in the Seventh Biennial Report of the Iowa Agricultural College, is revised, a number of species being added and a number of names taken from incorrectly determined specimens rectified.

The revised list is represented thus in the following families :—

Family *Forficulidæ.*

One species.

Family *Blattidæ.*

Four species.

Family *Phasmidæ.*

One species.

Family *Acrididæ.*

Forty-one species.

Family *Locustidæ.*

Twenty-three species, probably twenty-four.

Family *Gryllidæ.*

Ten species.

Total, eighty or eighty-one species.

HOW THE FEMALE OF CACOECIA SEMIFERANA PROTECTS HER EGG-CLUSTERS.*

BY C. P. GILLETTE, FORT COLLINS, COLORADO.

The Box Elder Leafroller, *Cacoecia semiferana*, was very abundant in many places in Colorado last summer, and in July the moths were swarming in the trees in the evening, presumably to deposit their eggs. The eggs were found beneath a gluey mass, somewhat similar to that used by the tent caterpillar in protecting her eggs, but it was largely covered with what appeared to be scales from the moth, placed like the shingles on a roof. A careful examination of these shingled patches under the microscope makes it seem certain that the eggs are first all deposited, the glue is then added, and after this the abdomen is laid at full length in the sticky substance until it hardens, when the abdomen is removed, and the scales covering its under side are drawn and left covering the eggs.

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*Abstracts of entomological papers read before the Iowa Academy of the Sciences, Des Moines, Iowa, December 28 and 29, 1891.

NOTES ON COLEOPTERA.—No. 9.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Philydrus, CAN. ENT., XVI., 186.—The paragraph commencing with "*Philhydrus*" should be corrected as follows :—*Philydrus perplexus*, Lec., and *P. Hamiltoni*, Horn, are found [on Brigantine Beach] in the fresh water pools which form at the base of the sand-hills, with *Hydrophilus glaber* and *Copelatus glyphicus;* while *Philydrus reflexipennis* occurs in the salt marshes under pieces of wood and recent tide-drift, seeming to inhabit salt or very brackish water, as it has not been taken in fresh water with the species mentioned. When the paragraph was penned *P. Hamiltoni*, since described, was supposed to be *reflexipennis*, and the true *reflexipennis* a variety of *ochraceus*.

Philydrus fimbriatus, CAN. ENT., XX., 63.—The variety noticed as inhabiting hill and mountain rivulets has recently been described as a species, and is *Cymbiodyta Blanchardi*, Horn.

Cercyon littoralis, Gyll.—This nice species occurred very abundantly in September at Longport, near Atlantic City, New Jersey. It inhabits under the softer grass washed from the Bay deposited on sand flats, and which has remained there long enough for breeding purposes. Though represented as very variable in colour and markings, the only differences observed in several hundred individuals examined was that about one-half were entirely piceous black, while the remainder had the posterior fourth of the elytra pallid. *Cercyon* has heretofore been much neglected by most American collectors, but the genus having been recently monographed by an able hand, and the species defined by characters usually of easy observation, they are likely to become better known. All things considered, this species seems to be native in North America as well as in Europe. Here it has been taken on Magdalen Island, Gulf of St. Lawrence ; Coney Island, New York ; the New Jersey sea coast, and in Illinois (Horn, monograph). In Europe, skirting the Western Mediterranean shores, it follow the Atlantic Coast to N. Lat. 66° 50′, and also occurs in Northern Asia on the shores of the Obi. The *Cercyons*, so far from being despicable, are very interesting beetles, and no genus of equal extent contains so many forms common to the Old and New Worlds. In fact, of the 25 American species monographed by Dr. Horn, 14 likewise occur in Europe.

Trogophloeus convexulus, Lec. — Several examples (it occurred abundantly) of this minute beetle were taken on the salt marshes near

Longport, New Jersey, in September. The identification is due to Mr. H. Ulke, confirmatory of a like diagnosis by myself. The most, or indeed all of the species of *Trogophloeus* which I have heretofore taken, occur wandering about in very wet places, taking refuge under leaves, sticks, &c.; but the present species differs in being found in places comparatively dry, and in constructing surface galleries like many of the species of Bledius, some of which it closely resembles. Dr. Leconte described the species from an individual from New York, and another from Kansas, which, till the present time, do not appear to have been duplicated. These two examples, measuring each .07 inch in length, represent the smallest individuals ; the length of a number taken together averaging over .09 inch. There are no thoracic impressions whatever visible in the great majority of individuals, but occasionally one of the larger ones bears indistinct traces of the usual basal marks, barely discernible in certain lights. The smooth thoracic line is usually conspicuous, which, with the piceous or black antennæ and parti-coloured feet, make this species of easy recognition. This species likewise occurred on Brigantine Beach, and may be looked for in the salt marshes anywhere along the Atlantic Coast.

Callichroma splendidum, Lec.—This well-known and highly-prized beetle is distributed along the Atlantic coast from Delaware to Key West, Florida, around the Gulf of Mexico to Southwestern Texas, and northward along the Mississippi to Arkansas. It is known to breed in the trunk and immense roots of a tree growing in the Southern swamps, especially in such as sustain Cypress, and is known in different places by such names as Sour Tupelo, Large Tupelo, Wild Olive, Wild Lime, Gum-Elastic Tree, &c., being the *Nyssa uniflora*, Walt., congeneric with *N. multiflora*, Weng., the abundant and well-known Gum Tree, or Pepperidge, common in many of the Northern States. The leaves and fruit of this tree, with several of its brilliant inhabitants, were recently received from Alabama, by which I am able to confirm the one or two observed records of its larval habits. It may, however, breed in other species of trees, as the first example in my collection was presented by a young naval surgeon, who took it on Key West, Florida, a place where *Nyssa* probably does not grow. The individuals of this species vary considerably in size, the sculpture of the thorax, and the colour of the elytra. An individual from Delaware measures .85 inch in length ; the one from Key West and another from Texas 1.70 inch each, but the average appears to be near 1.30 inch. The colour of the thorax is uniformly a brilliant fiery copper, with green reflections when seen after night or in certain lights, and is a specific character; the thorax differs in individuals from being deeply rugous to comparatively smooth, and in the prominence of the lateral spines and tuberosities. The elytra in the large majority are deep sericeous green, but in some examples, more or less shot with copper, which in some individuals becomes the prevailing colour, known in some collections as *virescens*.

Some time ago I had an opportunity to examine several examples of each of two species of *Callichroma* taken in Cuba, one of which, labelled *columbina*, Dej., seems only to differ from *splendidum* by having the thorax colored coppery bluish or violet; if other differences exist they escaped observation.

This species was described very briefly by Dr. Leconte under Dejean's catalogue name *splendidum*, with *Cerambyx elegans*, Fab., Oliv., Hald., in synomymy (Jour. Acad. Nat. Sci., Phil., 2d Ser., II., 37). Dr. Asa Fitch, however, states (Rep. 4, 711,) that Linnæus had previously described it under the name *suaveolens*, from an example sent him from Carolina by Dr. Garden. (Appendix to last Ed. Syst. Nat., III., 224, 1770.) At one time this species was considered an inhabitant of the West India Islands, being probably mistaken for *columbina* or some allied species. In fact, some of the species of *Callichroma*, of which I have seen nine, are uncomfortably close, and separated by characters which, in many genera, are of little moment.

C plicatum, Lec., is strikingly like *splendidum*, but the green colour of the head and thorax is constant and devoid of any coppery reflections. The habits of the two species, if I am rightly informed, are more confirmatory of their being specifically different than anything yet observed in their external structural characters. A friend (not an entomologist), from Hamilton County, Central Texas, says this species breeds in old cactus. While requiring further confirmation, this statement is probably correct, from the fact that there has been no record observed of its having been taken in swamps with *splendidum*, and from the fact that it occurs only in cactus regions in Texas to Arizona, where it was taken near the southeastern boundary at Camp Bowie. (Wheeler's Reports on Exp. and Surv., Vol. V., Zoology, p. 821.)

Eupogonius tomentosus, Hald.—Here this species is not common;

till recently all the examples in my collection were bred from dead hickory limbs (once). All other observed records of its habits represent it as inhabiting in its early stages pines. This is with scarcely a doubt the species Dr. Fitch describes under the name "*E. pinivora*, Pine-eating Gay-beard" (Rep. iv., 712), which he says differs from *E. tomentosus* by the erect hairs on the body and antennæ being black, a different form of spots on the elytra and the smaller size. The last two are of no value, as the length of *tomentosus* varies from .20 inch to .33 inch, and the elytra from having scarcely perceptible patches of pubescence to the high ornamentation of Dr. Fitch's *pinivora*, while the black colour of the erect hairs was very probably an optical deception, from a perhaps careless comparison of bright fresh examples with older faded ones; any one who has the insect can readily see how this might occur, by examining a specimen after night, or by a dull light. This species is distributed from Florida to Canada, occurring in New York and Michigan. The locality from which the hickory limbs from which my examples were bred were obtained is remote from any place growing pine, and the occurrence can scarcely be regarded as fortuitous. *E. vestitus* is very commonly bred here from hickory.

Elleschus, CAN. ENT., XVI., 106.—The *Elleschus bipunctatus*, mentioned at the place cited, proves to be one of the forms of *E. scanicus*, Payk., as determined by Dr. W. G. Dietz on comparison with authenticated European examples. The colour and the elytral markings of this species seem to be locally variable, and in the present instance scarcely or not differing from those of *bipunctatus*. This form has been sent me from Europe as *bipunctatus*, but an examination of the structural characters shows it to be the same as my American form. The typical form of Paykull was rufo-testaceous with fasciate elytra, and a similar form was taken by Dr. Dietz at Hazleton, Pennsylvania, from which a redescription of the species was made and a figure drawn (Tr. Am. Ent. Soc., 18, 264, plate vii., fig. 35, 35*a*). As he had not then seen this form it is not mentioned in Dr. Dietz's excellent paper, and from his description and figure of the species it would not be readily recognized as the same. Some individuals have no markings whatever, not even a trace, and all others have, more or less visible, the small spot on the disk of the elytra before mentioned, any others being attributable to abrasion. The colour varies from piceous to pale. This species is only known from here, and at Hazleton certainly. Common throughout Europe on willow.

Dr. Dietz records *E. bipunctatus* as occurring in Canada; Hubbard and Schwarz, in Northern Michigan.

Anthonomus musculus, Say, and *A. signatus*, Say.—In 1831 Say published in his Curculio, p. 15, a description of *A. musculus*, and on p. 25 that of *A. signatus*, and from the descriptions it is evident he had before him two distinct species. In Leconte and Horn's Rhyncophora, a species is assigned to each name separated by definite characters; and in Dr. W. G. Dietz's elaborate revision of the tribe lately published, these are still more clearly defined. One of these species is of economic importance, being occasionally exceedingly destructive to the cultivated strawberry. Owing to the difficulties encountered in attempting to separate them, some economic entomologists now solve the matter by uniting the species, unfortunately, under the name of the one having typographical precedence—*musculus*. Prof. C. V. Riley devotes several pages in one of the Government agricultural reports (1885, p. 276–282,) to the discussion.

The true *musculus* is not very common here, and is usually found in colonies on huckleberry blossoms—I have never taken a specimen on anything else—and occurs here from the middle of May till the first of June. Whole acres may be hunted over without obtaining a single specimen. The individuals seem to vary only from degrees of maturity, Say's description having been drawn from examples recently disclosed, while his variety is the more mature. *A. signatus*, on the other hand, is protean in colour and elytral ornamentation, so much so that judged by this alone it might be divided into several species. It appears about the first of June, and may be found more or less abundantly all summer. It eats the leaves and blossoms of many species of trees and shrubs. I have taken it abundantly on Tilea and Rhus, and it seems to have a decided taste for certain Rosaceæ—notably, *Rubus*.

Diligent search has several times been made in the fields of the cultivated strawberry without finding any *Anthonomus*, and efforts to obtain the strawberry form from correspondents have equally failed. *A. signatus*, however, is often seen on the leaves of the wild strawberry, through which it eats holes like it does to the leaves of Rubus. Both species may possibly depredate in strawberry plantations, but it would be a wide departure for the true *musculus* from any of its known habits.

From the unanimity of systematists in maintaining the distinctness of the species, it will be necessary for economic entomologists, if they care for accuracy, to make further investigation and ascertain which it is by which the mischief is done, or whether both species may not be concerned in different places. There will be little trouble in doing this, provided the huckleberry insect can be found with which to make the comparison, as they are only moderately difficult to separate when both forms are at hand.

NOTES ON THE ÆGERIADÆ OF CENTRAL OHIO.

BY D. S. KELLICOTT, COLUMBUS, OHIO.

The Lepidopterous family to which these notes pertain is a homogeneous and distinct one, clearly and sufficiently separated from other families. The larvæ, so far as known, are borers in roots, stems, branches, or excrescences of trees, shrubs or annuals, yet all strictly retain the structure and appearance of the young of their order. Most of them pass the winter buried in the food plant. A few, however, hibernate as pupæ or as larvæ, protected by cocoons. The most remarkable variation of the adolescent period is in the variable length of time from egg to pupa. Certain wood-boring species, *Harmonia pini* for example, pupate and disclose the imago the third year from the egg; others complete their changes in a few weeks. The pupæ are quite similar. The clypeus is usually armed with a protuberance, and the abdominal rings with transverse rows of spines, agreeing in this respect with normal pupæ of Tortricidæ, Cossidæ and Hepialidæ.

The moths are among the most beautiful of insects, and in other ways they are no less attractive. Their exquisite form, coloration and gracefulness of motion appeal to every one permitted to see them, but the highest enjoyment is reserved for those who appreciate the extent and exactness of *protective mimicry* exhibited by these insects. So intimately do they simulate the appearance, aided many times by sounds, odours and attitudes of wasps and bees, that the very elect in entomology are often deceived and cheated. Again, their habits render many of them grave pests, compelling attention from horticulturist and economic entomologist.

In spite of these reasons, and more that might be alleged for their collection and study, they are not well represented in collections. In fact, in a majority of collections which I have had the pleasure to examine Ægeriadæ, like Odonata, are few and ill-favoured. This is to be regretted; but since we have the material in abundance, the defects may and will be remedied. The situation is relieved somewhat by the thought that there is certainly one unique collection of the Ægerians in this country, namely, that of the late Henry Edwards. What disposition is to be made of it I know not. Perhaps no one does. All sincerely hope that it may speedily find a safe resting-place, accessible to the interested student, and where it will be properly cared for, and will duly honour our foremost student of this group.

The list of species of this family thus far collected at Columbus, I am aware, is only a partial one—one which it is hoped may be greatly increased in the near future. Such facts as are at hand, it is hoped, will prove interesting and suggestive. I follow the generic arrangement of Henry Edwards in Grote's Check List of N. A. Lepidoptera.

Melittia ceto, West., *(cucurbitæ*, Harris).—The squash-borer occurs abundantly in Central Ohio, and, indeed, throughout the State. In localities where cucurbitaceous plants are cultivated on a commercial scale it is a veritable pest. Is it double brooded? Since Dr. Harris's account of its habits more than sixty years ago, it has been regarded as single brooded, the moth appearing in early summer, the mature larva entering the soil in July and August, enclosing itself in a gummy cocoon in which it remains until the following spring, when it completes its transformations. During the last days of August Prof. F. M. Webster and myself found in squash vines on the Ohio Agricultural Experiment Station Farm larvæ of different sizes; a few inches below the surface cocoons containing larvæ were found, and one fresh imago was taken resting on the leaves. By September 20 all the larvæ were out of the stems and could be found in their dark, oblong cocoons from two to four inches beneath the surface. My friend Webster asked me if the species was two-brooded. I replied by asking him the same question. At the time I did not recall the paper by Prof. S. H. Scudder in Psyche, vol. iv., p. 303, in which he recounts finding in squash vines on Cape Cod in September two larvæ, one much larger than the other and apparently specifically distinct. He describes each and raises the question, Is *M. ceto* double brooded or are there two species passing under that name? Only the larger forms found by the writer were preserved and carefully examined; they were typical *Melittia ceto*. The single imago was likewise a typical example of that species. It seems probable from the facts at hand that in Central Ohio and South the species is double brooded.

Alcathoe caudatum, Harris.—This unique species is the sole representative of its genus. It was described by Harris in vol. xxxvi. of Silliman's Journal. His description has been copied by many authors and nothing added. This is evidently due to the fact that the insect is rare. A number of working entomologists have assured me that they had never taken it. The latter part of August, 1889, three examples were seen by me visiting blossoms of *Milcolotus* on the Ohio State University grounds ; two males were captured, the third, a female, escaped.

Harris describes the forewings of the male as "transparent from the base to the middle." In both of my specimens there are only clear streaks, one on either side of the median vein ; indeed, when first taken these lines were scarcely perceptible. The coxæ and femora are black ; tibiæ orange, with more or less perfect black rings at base and apex of second and third ; tarsi tawny orange, with first joint of last pair surrounded by a heavy band of orange hairs and a few black ones outwardly at the base ; the palpi are light, bright orange below, darker above, whilst the antennæ are of the same shade as the upper surface of the palpi, but having the double row of fringes blackish. The caudal appendage, which is fully as long as the abdomen, is bright orange ; the caudal tufts are black and orange. Harris gave the black currant as the larval food-plant. Henry Edwards, in Transformations of N. A. Lepidoptera, mentions the stems of *Clematis* also. I have not been able to find the larva in either of these plants.

Bembecia marginata, Harris.—This species occurs everywhere about Columbus in the native blackberry. Thus far I have not heard that it has given trouble to the cultivator. The moths may be taken in September resting on the foliage of plants near the food of the larva.

Podosesia syringæ, Harris.—As the specific name implies the larval food-plant is the lilac. If it would confine its attention to this old-fashioned ornament of lawn and garden it would have far less economic interest. But, unfortunately, it attacks and destroys the white and the European ash, as well as the mountain ash, *Pyrus Americana*. Large numbers of them were found in the trunks of the last in April, 1891 ; several trees on the Ohio State University campus were found greatly damaged by them. It may, therefore, yet be found to injure other and more valuable rosaceous trees in cultivation.

Sannina exitiosa, Say.—The Ægerian peach-tree borer is far too abundant wherever the peach is cultivated. Central Ohio is not an exception.

Ægeria gallivora, West.—In May last I obtained from a globular excrescence on an oak twig three Ægerians—one male and two females. They were at first taken to be *Ægeria hospes*, Walsh, until a careful comparison was made with the original description of that species in vol. vi., p. 270, of the Proceedings of the Entomological Society of Philadelphia, when I found good evidence that the moths were not of that species. The following characters seem to afford sufficient grounds for this conclusion:—1. They were larger, expanse .75 inch (*Hospes* .57 inch); 2. there is a well-marked black band at tip of hind tibiæ, in the female as wide as half the length of the joint, or the whole space distal of the middle spurs (*Hospes* has the tibiæ tipped with blackish only); 3. the second abdominal band of female is broad and the yellow ventral patch much longer and more clearly defined than in the male (according to Walsh, this band is not broad and the spot is only half as long as in the male); 4. the expanse of *Hospes* female is .50 inch, of these .75 inch; 5. and again, these have a yellow collar and the first joint of the antennæ maculate in both sexes, whilst the female *Hospes* has the first antennal joint immaculate (Walsh).

Are these moths Westwood's *Trochilium gallivora?* His description is inadequate, and without a comparison with the type there must always remain some uncertainty. Nevertheless, I refer my specimens to that species for the following reasons:—1. Westwood's specimens were bred from galls of *Quercus palustris* received from U. S. (Papilio II., p. 97). 2. The size is nearly the same (*Gallivora*, alar expanse 8 lines). 3. "*Legs yellow, with a dark ring around the tibiæ near the tips*," characterizes this feature exactly, especially true of the hind tibiæ; the first and second pairs are yellow, with more or less blackish on the outside of the tibial extremities.

The sexes of what I take to be *Ægeria gallivora* agree almost exactly in size and closely in ornamentation; the lower part of the front and a ring about the eyes milk white, above the white of the front shades into yellow, which extends about the first antennal joint, and is overhung by rather long blue-black scales, concolorous with the ground colour of thorax and abdomen; the palpi are yellow, blackish above; and the abdominal bands are two in both sexes, narrow in the male, the first narrow and the second broad in the female.

Although my material is scanty, I have reached the following conclusions regarding these gall-feeding and evidently inquiline species from oak and hickory: *Hospes* is a good species, but what Walsh has said about the supposed female pertains to a species as yet unnamed; and *Gallivora* is now rescued from forgetfulness.

Ægeria pictipes, G. & R.—This moth is quite abundant throughout this district, and does serious injury to wild and cultivated cherry, as well as the plum. I have seen at least a score of pupal skins protruding from one tree at the same time.

Ægeria acerni, Clemens.—Great numbers of our maple shade trees are injured, often ruined, by this species. It is, however, rarely seen in the forest.

Ægeria tipuliformis, L.—The imported currant-stem borer is said to occur in Central Ohio. I have not yet taken it.

Ægeria lustrans, Grote.—I have two examples. The type was captured by G. R. Pilate near Dayton, O., and is said to be "common in one place." The food-plant is unknown.

Ægeria corni, Hy. Edw.—A moth taken at Sugar Grove, O., July 3, 1891, visiting the blossoms of basswood, I refer, with some hesitation, to this species. It resembles *Acerni*, but is smaller, and in every way more delicate. The agreement with Mr. Edwards's description of *Corni* (Papilio 1, 190,) is close, except the blackish third article of the palpi is not mentioned, and the underside of the caudal tuft is reddish orange or tawny, and not "bright orange." The expanse is 18 mm. instead of 15 mm.

Carmenta pyralidiformis, Walker.—Rare at Dayton. See List of G. R. Pilate, Papilio II., 65.

Albuna modesta, n. sp. I propose this name for a species taken on the University campus at Columbus in August last, resting on foliage. I have compared it with all of Mr. Edwards's descriptions of species in *Ægeria*, as well as *Albuna*, and examined as many of his types as I have been able to consult; also the species in the National Museum at Washington. I cannot recognize it among the descriptions or specimens.

The female has the head, thorax, abdomen and wings black above; the palpi are rather long, sordid white below and inwardly, blackish above and outwardly; the eyes are bordered by pale yellow scales; the antennæ are black, with a white patch on the upper posterior surface one-fourth the length from the tip; apical tufts black; thorax and abdomen without streaks or bands above, beneath both are paler, with a few yellow scales on the sides of the metathorax. The anterior vitreous space of the fore-wings is small and triangular, the posterior one likewise small and oval; interveinular spaces of the apical patch golden; hind-wings with very narrow black border, fringes throughout blackish; beneath hind-wings as above, fore-wings yellow to the discal spot, with interveinular spaces beyond of the same hue. Fore-coxæ black, with pale scales, especially on lateral edges; femora black, with more or less pale; tibiæ black, with the spines and a few scales at tip sordid white; tarsi blackish, ringed with dull white; abdominal tufts slight, concolorous, with a few yellow points at base laterally.

Expanse, 18 mm.; length, 9 mm.

I have referred the moth to *Albuna* rather than *Ægeria* for the following reasons: 1, "the head is narrower than the thorax, which is not produced far beyond the base of the wings;" 2, "the antennæ are comparatively short," not reaching to the discal spot; 3, the legs are relatively short, on the other hand the tibiæ are not more than usually clothed with scales; 4, "the markings of the wings are heavy, the space between the submedian nervure and the inner margin is clothed with scales," except a minute clear space proximate of the clear triangle, and within the submedian; 5, the abdomen is fusiform without the apical brush.

The finding of the male may make the generic reference more certain.

BOOK NOTICE.

List of Lepidoptera of Boreal America, by John B. Smith, Sc. D., etc., Philadelphia, American Entomological Society, 1891.

Prof. Smith divides the Lepidoptera into seven suborders:—(1) The Rhopalocera, containing four families; (2) the Heterocera, containing twenty-three families, and comprising the Sphingidæ, Ægeriadæ, Thyridæ, Zygaenidæ and Bombyces of Grote's list; (3) the Noctuina, containing three families; (4) the Geometrina, containing the single family Geometridæ, divided into nine subfamilies; (5) the Pyralidina, containing seven families; (6) the Tortricina, containing three families; (7) the Tineina, containing twenty families. Prof. Smith has been assisted by Dr. Skinner in the Rhopalocera, by Dr. Hulst in the Geometrina and Pyralidina, by Prof. Fernald in the Pyralidina and Tortricina, while the entire list of the Tineina is by Dr. Riley. The list contains 6020 numbered species, which includes the unidentified species described by Walker (243 in number) and other authors (in all, 79 names).

There are a few inaccuracies and omissions among the Bombyces which I should like to notice :—

Family Nycteolidæ, page 23. add *Sarrothripa reveyana*, S. V. (See Hy. Edw., Bull. 35, U. S. Nat. Mus., p. 55).

Family Lithosiidæ, No. 966. *Nola minuscula*, Zeller, should have precedence as it was described in 1872 (Verh., d. k. k. Zool. Bot., Gesell. XXII., 455), while *fuscula*, Grt., was not described till 1881 (Papilio, I., 76).

Family Arctiidæ, p. 27, No. 1113*a*. *Arctia sciurus*, Bdv., is given as a variety of *Euchætes collaris*. Mr. Hy. Edwards once stated to me that it was the same as his *E. yosemite*. This would be a more probable synonymy, *sciurus* having precedence.

Family Liparidæ, p. 28, No. 1166, Walker's *clandestina* was referred to *Gluphisia* by Mr. Grote (Can. Ent., IX , 21), but I do not know it, and it may really be *Dasychira*.

Family Notodontidæ, p. 30, add *Gluphisia avimacula*, Hudson. No. 1277 is the same as No. 1285, *Pheosia dimidiata*. H.-S , and I am of the opinion that *P. rimosa* and *P. californica* are synonyms of this. (See Psyche, VI., 194.) No. 1289, *Edema albicosta* is given as a synonym of *E. albifrons*. The forms can be distinguished, and I am not aware that they have been proven varieties. Nos. 1300 and 1302 are better referred to *Schizura* in my opinion. (See Psyche, VI., 177.) Page 31, No. 1339 is probably a synonym of No. 1345. No. 1342*a* is not a variety of *Cerura occidentalis*, but of *C. cinerea*. Perhaps I am responsible for this error, as my table in Can. Ent., XXIII., 87, may be a little ambiguous, for I placed the var. *cinereoides* before *cinerea* instead of after it on account of the arrangement of the table. No. 1343, *C. scitiscripta* is given as a synonym of *C. cinerea*. This is surely a mistake. So far as I know it is a good species, and I have referred *candida*, Lint., as a variety of it, and not of *cinerea*, as it stands. *C. candida*, Lintn., has no affinity with *cinerea*, but the three forms, *scitiscripta*, *candida* and *multiscripta*, constitute a distinct group of the genus. Add *Cerura modesta*, Hudson.

Family Ceratocampidæ, p. 32, add *Dyocampa riversii*, Behr.

Family Bombycidæ, p. 33, *Hemileuca neumoegeni*, Hy. Edw., seems to have been overlooked. No. 1401, *Clisiocampa strigosa*, Str., is a synonym of *C. constricta*, Str. *Gastropacha alescensis*, Pack., seems to be wanting. (See Stretch, Zyg. and Bomb., N. A., p. 113.) No. 1419½ should be *Thauma ribis*, to keep the original orthography. (See Hy. Edw., Proc. Cal., Acad. Sci., V., 265.) And, finally, *Eutheca mora*, Grote, has been left out. (See Bull., U. S. Geol. and Geog. Sur. Terr., Haydn, VI., 257.)

The list will be the standard for some time to come, and should be in the possession of every entomologist.

Harrison G. Dyar.

Mailed February 6th.

The Canadian Entomologist.

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MISCELLANEOUS NOTES ON BUTTERFLIES, LARVÆ, ETC.

BY W. H. EDWARDS, COALBURGH, WEST VA.

1. An albino male *Colias Philodice.*

I received this example from Mr. H. E Wilford, of Batavia, N.Y., last fall. Mr. Scudder, Butt. N. E., p. 1286, says:—"Instances of albinism are confined, so far as we yet know, to the *Rhodoceridi*" (which term he uses to include *Colias*, under his name of *Eurymus)*, "and to the female sex." In colour this male is white, with no tint of yellow; the borders of both wings are of median width, and solid—in all respects like the usual border of the yellow male. It was taken at Batavia last summer. Mr. Wilford wrote that at the time albino females were unusually plentiful.

2. An abnormal *Papilio Asterias.*

Mr. David Bruce sent me several larvæ of *Asterias* from Platte Canon, Colorado, 1st August, 1891, and I reared them to imago. One of these butterflies is a male by its body and claspers; female, by its wings. The male *Asterias* has two longitudinal abdominal rows of yellowish spots, sub-dorsal and lateral, and this example shows these rows, and no other yellow markings; the female *Asterias* has not only the same two rows, but a semi-row on either side the mid-ventral line on the three or four last segments. The hindwings are of the usual type of the female *Asterias*, and therefore without the mesial yellow band, which belongs to the male. The forewings are destitute of this yellow band, and also of the extra or discal row of yellow spots to be found in both sexes of *Asterias*. The submarginal row of yellow spots is present, but the spots are very small. So that the only yellow found on the forewing is in these submarginal spots. On the under side of the forewings, however, the extra discal spots are present, and the spots of the submarginal row are as large as is usual in female *Asterias*. Mr. Scudder says, p. 1759: "Specimens showing a mingling of the characters of the two sexes, called gynandromorphs, are by no means unknown." He mentions seventy-one published examples of such, of which eight belong to the Papilioninæ: " most of these show complete bilateral distinction, the wings of one side being of one sex, of the other of the opposite sex. Dr. W. J. Holland writes me that he has a Papilio *Polyxenes*" (Mr. Scudder's name for *Asterias)* "collected by Mr. Mead, in which the abdomen is female, while the wings have the male colouring." The example I describe above is, then, just the reverse of the one in Dr. Holland's collection, the abdomen being male, the wings female. I hope to get this specimen, as well as the albino male Colias, figured in my Volume III.

3. *Papilio Bairdii.*

Mr. Bruce also sent me eggs of *P. Bairdii*, from West Colorado, in 1891, obtained by confining the female over the food-plant; and from these I reared several larvæ to pupa and imago. The butterflies in no way differed from the typical forms. The larvæ were distinctly different from the *Asterias* larvæ, which were feeding at the same time. I have the set of drawings of them by Mrs. Peart, and shall certainly figure the stages in Butt. N. A.

4. New species, *Papilio Hollandii.*

Mr. Bruce obtained in West Colorado three examples, male, of a *Papilio* wholly unknown to me, and which lies between the sub-groups of *P. Zolicaon* and *Asterias*. Like the species of the former sub-group, the abdomen is yellow. In all the members of the other sub-group the abdomen is black, with rows of yellow spots. The upper side of both wings in these examples is not distinguishable from the male *Bairdii*, the yellow bands and spots being of the same character, and the anal ocellus has its sub-oval pupil connected by a black ligament with the marginal stripe. On the under side the facies is quite different from *Bairdii*, by reason of the marginal yellow spots being very large and confluent; the spots of the mesial band very large, fully as much so as on the upper side. The abdomen is wholly yellow, except for a black dorsal stripe and four fine lines beneath, two on either side the venter.

It has been suggested that these might be hybrids between *Zolicaon* and *Bairdii*. I know nothing of hybrid butterflies, and if there is positive evidence of such a thing in nature, I do not remember to have heard or read of it.*

It would not seem very likely that a colony of hybrids, so numerous as to allow of catching three individuals in one district, would be discovered. Now, I have a female Papilio, taken in Arizona years ago by one of the Wheeler expeditions, that must be of the same species as these males from Colorado. The hindwings are wholly wanting, but the forewings are good and agree with *Bairdii;* while the body is exactly like these males, allowing for the difference of sex. This specimen had always been a puzzle to me, and I looked for light on its peculiarities to come some day. I do myself a pleasure in naming this Papilio after my distinguished friend, Dr. Holland. Mr. Bruce will probably get eggs from the female of this species next summer.

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*Under the heading of "Hybrids" in index to Butt. N. E., I find five pages referred to. On p. 283, we read "that hybrids occur between this species *(Astyanax,*" (i.e. *Ursula)* "and *Archippus*" (i.e. *Disippus)* "is rendered probable by the remark of Mr. Mead, who found an *Astyanax* on whose upper surface the blue was supplanted by fulvous," etc.; and also of Grey, who says, CAN. ENT., XI., 17, he possesses "a melanitic form of *Disippus* with all the markings of *Ursula* on the under surface." Now these may be cases of hybridity, and may not. The American species of *Limenitis* are so closely allied that they would seem to be but one remove from a common parent, and as probably as not one of the black species is nearest that parent. These variations in occasional individuals of one species in the direction of another species may be cases of reversion or mere sports. Hybridity is conjectured, not proven.

On p. 289 et seq., is a discussion of the supposed hybridity by wholesale of Limenitis *Poserpina* (between males of *Arthemis* and females of *Ursula*, and *vice versa).* I have shown the improbability of this mixing up in CAN. ENT., XXIII., p. 49, et seq., and that all the phenomena may be accounted for in a different way, with no violation of probabilities.

On p. 445, we read: "Mr. H. Edwards describes a hybrid between Pyrameis *Atalanta* and *Carye:*" "The under side is that of *Atalanta.*" Mr. Scudder adds here: "Hybrids among butterflies are of extreme rarity." Cases of copulation between butterflies of different species of the same genus have several times been observed and recorded, even of different genera. I reported one in C. E. recently between two of different families, viz., a Melitæa and Chrysophanus. But I do not know of instances (though such there may be) where such copulation has led to eggs from which the larvæ were bred to pupæ and butterflies produced. In only this way could we be sure of hybridity.

On p. 1212, we read that a Pieris *Rapæ* paired with a Pieris *Protodice* (these at least belong to different subgenera) and the female laid eggs which hatched. But the larvæ all died, and so nothing came of this conjunction.

On p. 1363, under Papilio *Asterias (Polyxenes)*, we are told: "No hybrids are known"; after which it is related that "Mr. Edwards possesses an hermaphrodite" specimen, etc. I conclude, knowing Mr. Scudder's habit of thorough research, that no other instances of possible or probable hybridity have been reported among American butterflies.

5. *Papilio Oregonia.*

Until recently this species was known only in east Washington and Oregon; but the late W. S. Foster, two years ago, took a fine example at Park City, Utah. Mr. B. Neumoegen has sent me for inspection a male taken somewhere in Utah. And, in 1891, Mr. Bruce found several examples in west Colorado. It is evidently a desert species, ranging from Washington to Arizona. In 1890, I had larvæ sent me from east Washington, believed to be of *Oregonia.* But, as they were found on the plants, the sender could not be certain. I saw all the stages from second to adult larva, and obtained one pupa. Of the last two larval stages, I have drawings made under the supervision of Prof. Riley. The larval markings and colours were unlike any Papilio larvæ I have known, and I think the species is certainly *Oregonia;* it can be nothing else, coming from that locality. But, as the pupa died before imago, I could not figure these stages on a plate as *Oregonia.* Now, I hope to obtain eggs and begin from that stage, and so get the set of drawings for publication.

6. *Anthocharis Sara* and *A. Reakirtii.*

On March 31st, 1888, I received eggs and larvæ (hatched on the way) of *Reakirtii*, laid 22nd inst. One larva passed first moult, 2nd April; second moult, 4th; fourth moult, 8th April, and pupated on 13th This pupa gave a true *Reakirtii* imago the next year, 12th April, 1889.

On June 4th, 1888, forty-three eggs laid by *Sara*, in confinement, were sent me by Mr. A. Koebele, but the plant with them rotted, and not more than two larvæ reached me alive on 11th. Mr. Koebele wrote that *Sara*, of May and June, proceeds from eggs laid by *Reakirtii* in March; but that some pupæ went over the winter to produce *Reakirtii* in the early spring; also that the product of *Sara* was *Reakirtii* of the next spring. The dimorphism is as that of Papilio *Ajax*.

It is very common for pupæ of Anthocharis to go over two winters Mr. Koebele wrote me, in 1888, that he then had pupæ of *Sara* and *Cethura* that formed in 1886, and one of the first named he sent me, labelled May, 1886. This, soon after I got it, gave imago *Reakirtii.* I have a living pupa now of *Genutia* of 1890, the only instance I have known in that species. *A. Ausonoides* passes two years in pupa sometimes. Both *P. Rutulus* and *P. Daunus* sometimes pass two years in pupa.

7. Caterpillars that go over two years.

I had a larva of Cœnonympha *Inornata* out of egg received from Mr. Fletcher, at Ottawa, go over two winters. Three larvæ hatched 18th August, 1888. One of these became lethargic after second moult and hibernated. On 6th May, 1889, it passed the third moult; the fourth, 9th June. In July was asleep again, and so passed the winter of 1890, and died in the following spring without further change. Others, of a lot from Montana, hibernated after second moult and pupated the following spring.

A similar habit has been noticed in Melitæa *Anicia*, Doubleday. This species is common on the tops of the highest peaks in Colorado, and so north to and beyond Laggan Until recently, the lepidopterists of this country were uncertain what *Anicia* was, and the name came to be applied to a rather large red species found in Nevada and California. But Mr. Henry Edwards, on his last trip to London, examined the type specimens in British Museum, and having with him several of his own Melitæas, identified the right one, and distributed examples of it to some of his correspondents. It is a small dark and dull species, and is said by Mr. Bruce to swarm in its localities.

I received eggs of *Anicia* from Mr. Bean, at Laggan, 5th July, 1889. The larvæ fed here on Pentstemon, and at once from the egg protected themselves under a common web. The first moult took place on 11th July; the second, on 14th; third, on 20th July; and in August all were asleep and were sent to Clifton Springs. They were received again, 2nd April, 1890, and soon began to feed. On 12th April several passed the fourth moult, and near the end of the month had gone to sleep again. Up to middle of September no change had taken place, but late in the fall they were found to be dead. In a state of nature these larvæ would pass the hibernating period on the ground among leaves and rubbish, but I could not attempt to imitate the conditions without certainty of mould, and so destruction. I wrote Mr. Bean about this experience, and he replied (last of Oct., 1890,):—"My four *Anicia* of 1889 still stay with me." Later, 17th Nov.:—"Two of the 1889 *Anicia* went into hibernation alive."

Whether any of the species of *Chionobas* in America require two years between egg and imago has not yet been ascertained. Mr. Scudder, Butt. N. E., is inclined to think *Semidea* has "a biennial cycle"; and

Mr. Fletcher, that *Macounii* (from Nepigon), has that habit. *C. Brucei*, allied to *Semidea*, has with me reached adult larva the first season, and probably the Colorado *Semidea* would behave the same way. But the conditions in Colorado, even on the highest peaks, are not so trying to insect life as on the White Mountains.

8. Food-plants of certain Colias larvæ.

The larvæ of *C. Scudderii* and *Nastes* feed on willow. I found those of the former would not touch white clover (or any clover) which the other alpine species, *Meadii*, *Elis*. *Alexandra*, eat; and it occurred to me to try willow. I gave them tender leaves of weeping willow, and they took to it at once. Mr. Bruce saw the female laying on a species of Vaccinium at Hall Valley, caught and confined her and got twenty eggs. He told me that he had often noticed the females flying in and out the dwarf willows as if laying eggs. I got the larvæ past second moult and then lost the whole of them.

As to *Nastes*, Mr. Bean, at Laggan, wrote:—"The larvæ feed on willow, and not mountain willow only, but from the banks of the Bow. I don't find any eating Vaccinium, but a lot on Hedysarum are doing well."

Messrs. Fletcher and Scudder obtained eggs of *C. Interior*, at Nepigon, and distributed part of them. I had fifteen or twenty, and they hatched; but the larvæ refused white clover and several other sorts of leaf which I tried them on, and all starved. I did not then know that willow was a food-plant of any Colias. Neither of the gentlemen named had better success than I had. Mr. Bean told me later that the food-plant of *Interior* was Vaccinium.

9. *Colias Meadii* and *Elis*.

These species, in their early stages, cannot be separated. The larvæ are precisely alike, even under the glass, so far as I have been able to discover, and they differ in appearance from all other larvæ of the genus observed by me, being thickly coated with short, black bristles, or stiff hairs. There is a basal stripe of pure white, with no red in it, and a subdorsal stripe of yellow-white. Many of the imagos of *Meadii* taken at Hall Valley and on the higher levels, in September and October, are very pale coloured (as to both the orange and black), and are undistinguishable from examples of *Hecla* from the Arctic Sea, except that the *Meadii* males (as well as *Elis*) have the mealy spot on costal margin of hindwings, which *Hecla* shows nothing of. If a *Hecla* ever appeared with that spot, I should say the two were forms of one species.

I sent a pair of these to London to be submitted to two of the most experienced lepidopterists there, and asked them to tell me in writing what the species was. I gave no information about the pair, except that they were taken somewhere in America. Both the experts replied that the species was *Hecla*, but they noticed the presence of the mealy spot. In the museum collection, all the male *Hecla* were without that spot, and I cannot learn that it is known in any collection.

These pale examples are not worn but are fresh and evidently not long out of pupa. They must be the product of eggs laid by the earlier imagos the same season. Mr. Bruce wrote 7th Sept., 1890, that he had "just been up Gibson Mountain; elevation 14,000 feet; all barren and desolate. All I saw was two *Alexandra* and three *Scudderii*, half a dozen *Meadii*, a dozen *Arg. Eurynome*, and as many *P. Smintheus*. I send two of the *Meadii* to show you the colour." These were the first examples I had seen approaching *Hecla*, and on calling Mr. Bruce's attention to them. he presently took several others of same type about Hall Valley. That the imagos do sometimes come out the same season the eggs are laid, appears from my experience with larvæ at Coalburgh. On 23rd July, 1888, I received larvæ just out of egg from Mr Bruce; these passed the first moult, 27th; one passed the third moult 9th Aug.; the fourth, 14th: pupated, 19th; and the imago came out 25th August. The rest of the larvæ passed the third moult and hibernated. I sent them to Clifton Springs, N.Y.; got the survivors back in April following, and on 21st and 23rd April they passed the fourth moult; on 5th May one pupated, and gave imago 12th May.

In 1889, on 30th August, or five weeks later than in preceding year, I received eggs. Between the 23rd and 30th of September, all the larvæ were in hibernation after only two moults. The same year a second lot of eggs came 1st September. The larva hibernated after second moult.

In 1890 eggs were received 8th August; nearly all the larvæ hibernated after second moult, but a few went to third and one to fourth, but all these died before reaching pupa. In all cases observed the larvæ hide themselves in and among the dead leaves at the base of the clover plant, and so hibernate.

Of *Elis*, I received from Mr. Bean, at Laggan, 23rd July, 1889, several larvæ just out of egg, the eggs having been laid 17th. They passed first moult 28th; second, 1st and 2nd August. On 12th one passed third moult. In all, six got through third moult, and shortly after went into hibernation, and were sent to Clifton Springs. Two came back alive 2nd April, 1890, and they passed fourth moult 12th and 14th April. One passed the fifth moult on 24th; was sent to Mrs. Peart, at Philadelphia, and pupated there 4th May; was mailed to me and never arrived. The other larva died before pupa.

On 20th and 22nd July, 1890, eggs and larvæ just out arrived. Nearly all the larvæ hibernated after second moult, but two reached fourth by 20th August. One of these died shortly after that, the other went on to the end of the stage; changed colour for pupation, and then died. But I concluded from this that in native conditions some *Elis* must reach imago the same year in which the eggs are laid, as with *Meadii*.

On 24th May, 1891, I received six larvæ from Mr. Bean which had hibernated at second and third moults. They were sent just as they were taken out of the snow, and were but half awake when I received them. Had not suffered on the journey, though sealed up in a piece of cork and six days on the way. From these were obtained three imagos, 1 ♂ and 2 ♀ ♀, on 28th and 29th and 30th May.

To me *Elis* is a very puzzling species, exceedingly close to *Meadii* in some examples, but considerably different in others. Mr. Bean, who lives in the *Elis* district and has caught multitudes of them and bred from the egg many, is fully of the mind that the species is distinct; and I defer to his judgment.

[TO BE CONTINUED.]

PAMPHILA MANITOBA, SCUD., AND ITS VARIETIES.

BY H. H. LYMAN MONTREAL.

In 1874 Mr. Scudder published his paper on "The Species of the Lepidopterous Genus Pamphila" in the Memoirs of the Boston Society of Natural History, in which the following species were described as new :—Nevada, Colorado and Manitoba, and Sassacus ; Ottoe, Juba, Comma of Europe, and Sylvanoides were also treated of.

None of the descriptions are detailed, but are altogether comparative, pointing out the differences between the closely allied forms, and in the case of Manitoba the comparisons instituted are exclusively with the European Comma. The four specimens, 2 ♂s and 2 ♀s, illustrated, are all from the west of the continent, or rather, I should say, from the west and centre. One specimen was from Lake Winnipeg, one from Colorado, and two from British Columbia. The figures show specimens of which the underside of secondaries is dark greenish or greenish-brown, and with considerable variation in the prominence or restriction of the markings.

Though no figure of any eastern specimen is given it is stated in the text that the species had been taken at Riviere du Loup by Mr. Couper.

Since then it has been repeatedly taken on the Lower St. Lawrence by other collectors at Cacouna and Rivière du Loup, Metis, and even as far as Gaspé by myself in 1888.

The form found on the Lower St. Lawrence is very uniform in colour and has the outer third of the underside of the forewings and the whole of the underside of the hindwings, with the exception of the inner margin and hind angle, of a dark brown colour, though occasionally with a slightly greenish tinge.

In 1890, on returning east from a trip over the Canadian Pacific Railway, I stopped for a day at Regina, the date of my visit being August 5th, and as usual devoted a good part of the day to collecting Lepidoptera. Among other things, I collected a good series of males of a Pamphila of the Manitoba group, which was new to me, but only succeeded in securing one female, it apparently being a little early for that sex. During October of that year I paid a flying visit to New York and Boston, taking a few specimens with me for comparison, among them a specimen of this skipper, which I showed to Mr. Henry Edwards, who said that he did not know it, and thought it must be new. Mr. Scudder said it might be new, but one needed a very full series in that group. I afterwards showed it to Mr. Fletcher, and asked him if he had ever seen that form, and he immediately said "Yes, at Regina." He added that he had sent a specimen to Mr. Eugene Aaron, who had pronounced it to be only Manitoba, but Mr. Fletcher expressed to me the opinion that it was at least a very distinct variety. The point in which this form chiefly differs from Manitoba of the Lower St. Lawrence is that those parts on the underside, which are brown in the latter, are of a very pale greenish-yellow or yellowish-green in the Regina form, but it also differs somewhat above in that the males are usually of a yellower tone while the brown of the female is decidedly darker and the spots of the forewing decidedly lighter, some of them being almost white, than in the Eastern specimens.

Wishing to get further light upon the probable relationship of these forms this year, I took a number of specimens of each with me on a trip to Boston and New York before returning home from a short holiday on the Atlantic Coast, and through the kindness of Mr. Scudder was enabled to examine his original types of Manitoba. One of these agreed exactly with my specimens from the Lower St. Lawrence, while the ones from British Columbia and Colorado were greener, but none agreed with, or even approached the average of the Regina specimens. Mr. Scudder, however, on account of the close similarity of the markings, seemed to be of opinion that the Regina form must be a variety of Manitoba. At New York Mr. Neumoegen kindly allowed me to compare my specimens carefully with the Pamphilas in his magnificent collection, but no specimen was found which at all agreed with the Regina form, and Mr. Neumoegen expressed the opinion that I should be safe in describing it ; but in order to guard against all danger of being accused of rashness, I took the specimens out to New Brunswick, N. J., to Prof. J. B. Smith, who very kindly, at my request, dissected the male abdominal appendages of one of the Regina specimens, which upon examination were seen to be practically identical with the illustrations of those of Manitoba, drawn by the late Mr. Edward Burgess, and published by Mr. Scudder. The form would therefore seem to be only a variety of Manitoba, but Prof. Smith expressed the opinion that it might very properly receive a varietal name as a distinct geographical race. Mr. Scudder, however, in his "Butterflies of New England" would seem to have adopted this form as the basis of his description of Manitoba, as he describes the underside of the hindwings as being, except for the markings, "almost uniformly greenish-yellow," although he has no specimen of the Regina form in his collection.

I am, however, strongly of opinion that the difference between the Eastern specimens and those from Regina is sufficiently great to be worthy of being indicated by varietal names, and if the name Manitoba is to be restricted to the dark-brown or greenish brown specimens, as I believe it was originally applied, I would suggest the name, var. Assiniboia, for the light greenish-yellow Regina form. If, however, it is preferred to call the latter Manitoba, I should suggest the name, var. Laurentina, for the dark-brown form of the Lower St. Lawrence.

NEW SPECIES OF PYRALIDÆ.

BY GEO. D. HULST, BROOKLYN, N. Y.

Myelois fructetella, n. sp.—Expands 16–18 mm. Head dark fuscous; maxillary palpi fuscous, becoming black on end member. Antennæ and thorax fuscous-gray to dark fuscous; abdomen yellowish-fuscous, ringed with dark fuscous on anterior part of each segment; forewings light gray, heavily marked with fuscous and black; base to basal line, with black scales, which become very heavy within basal line along inner margin; middle field much darkened on posterior half, with fuscous continuing along both lines, broad and black at costa along basal line, and narrow and black at costa along outer line; outer field broadly black along costa outside of outer line, becoming lighter posteriorly and along outer margin; fringe very light gray; basal line white, straight in direction or somewhat dentated, near middle distinct; outer line less distinct, with a large but not deep sinus outwardly at middle; hindwings translucent fuscous becoming darker at edges.

I have four specimens—all females—from Arizona and Texas. The insect very much resembles dark specimens of *Mineola juglandis*, Le Baron.

Myelois elegantella, n. sp.—Expands 29 mm. Gray, more or less overlaid with black scales. Forewings, lines white, distinct, edged narrowly on both sides with black, the basal line well out from base with two dentations inwardly at middle, the outer line with a strong subcostal dentation, then finely serrated till near inner margin. The gray of the ground colour is at places much overlaid with the black scales, becoming very distinctly black at middle of basal space, across the middle field and along outer border. The outer edge is black broken by the fine, light gray lines of the veins. Hindwings translucent fuscous, darker on outer edge and with a fine black border line.

The aspect of the insect is much like that of a *Salebria.* Seattle, Wash.

Myelois texanella, n. sp.—Expands 19 mm. Head, thorax and forewings light gray, composed of chalk white with a light mixture of dark scales. Forewings with a blackish space at extreme base near middle; lines faint but distinct, the inner slightly bent near costa, slanting thence outwardly to inner margin, the outer angulated outwardly at middle, rounded inwardly below costa, somewhat dentate above inner margin, outer margin with a series of black triangular points, two black superimposed discal points; all lines white, narrowly edged with black; hindwings translucent fuscous. Blanco Co., Central Texas.

Myelois leucophaeella, n. sp.—Expands 22 mm. Head, thorax and forewings uniform dull fuscous-gray; lines of forewings distinct but not sharply defined, both dull white, the basal running obliquely outward from costa with two large dentations, the outer well towards outer border, evenly and sharply dentate below the middle. Hindwings even dull fuscous. Iowa.

Acrobasis cirroferella, n. sp.—Expands 18 mm. Head light gray in front, otherwise fuscous; palpi light gray, dark on last segments; antennæ light gray at base, beyond fuscous. Thorax dull fuscous. Forewings dull fuscous gray, lighter and clearer along costa, on basal and median spaces; ridge of basal scales black, preceded by gray, not extending to costa; a black line begins at costa just above scale ridge, and bending evenly outward and downward, follows then to costa parallel with the scale ridge; outer line very close to border, very nearly lost in the general fuscous colour, but most distinct costally, and only slightly bent medianly in its course. Abdomen fuscous, segments lined. Austin, Texas.

Salebria levigatella, n. sp.—Expands 28 mm. Head and thorax blackish. Forewings smooth, of an even fuscous, the costa more rounded than usual, basal space to basal line of a dull red colour, lines indistinct, the basal faintly discernible, dentate, the outer very faint or entirely obsolete. Hindwings fuscous, darker outwardly. Amherst, Mass., from Dr. C. H. Fernald; also from Wisconsin.

Salebria purpurella, n. sp.—Expands 27 mm. Face and palpi gray, mixed with black; the summit of head stained with reddish. Thorax and abdomen fuscous, with reddish stain. Forewings gray, heavily washed with reddish-purple, the gray being more clear before basal line and along costa before outer line. Basal line near base, apparent only on posterior half, lined on each side with black; outer line very faint and indistinct close to margin. Hindwings fuscous, tinged slightly with reddish near anterior angle. New Mexico.

Zophodia bella, n. sp.—Expands 28 mm. Head and palpi fuscous-gray; thorax fuscous; abdomen fuscous; the segments lighter posteriorly. Forewings gray, clear along costa, washed with fuscous behind subcostal vein, this running in longitudinal lines on the veins and interspaces, being especially distinct on the veins. Basal line suggested by diffuse blackish spots; outer line quite indistinct, oblique from costa, then strongly dentated; a subterminal line of diffuse black spots; two discal dots black, diffuse, the anterior more distinct. Hindwings light fuscous with marginal black line. Massachusetts.

Ocala, n. gen.—Labial palpi long, porrect; maxillary palpi distinct, pencil tufted; tongue long, antennnæ bent above base with tuft of scales in bend; forewings 11 veins, 4 and 5 stemmed, 10 separate; hindwings 7 veins, 3 and 4 stemmed, 5 wanting. Abdomen in ♂ tufted. Very near to *Dolichorrhinia*, Rag., and differing principally in the presence of the pencil tufted maxillary palpi and tufted abdomen.

Ocala dryadella, n. sp.—Expands 18 mm. Palpi and head fuscous gray, thorax light fuscous or dirty white, abdomen same colour with heavy anal tufts beneath and on sides in male; forewings fuscous gray, basal line well out near middle of wing, faint, edged outwardly with diffuse broken black, outer line close to margin, indistinct, rounded, serrated; two black discal dots, very small: a comparatively large, oval black spot on basal space near basal line just above inner margin. Hindwings translucent, light fuscous.

Charlotte Harbor, Fla. From Mrs. A. T. Slosson to whose kindness I am indebted for many favours, and to whom I give my grateful thanks.

Diviana nymphæella, n. sp.—Expands 21 mm. Palpi very long, much exceeding head, the second member especially being lengthened, dark fuscous, whitish in front. Head blackish fuscous, collar blackish. Thorax dull gray. Abdomen lightish gray. Forewings fuscous gray lines indistinct, the basal indicated by a deepening of the dark colour on either side, outer line near outer edge and parallel with it; discal spots distinct geminate, a marginal line of black spots. Hindwings light fuscous. Charlotte Harbor, Fla., from Mrs. A. T. Slosson.

It was my intention to erect a new genus *Palatka* for this species, more especially on account of the very long erect labial palpi, but I have concluded to place it under *Diviana*, which it nearly approaches. I mention this, as I gave the MS. name, *Palatka*, to Dr. J. B. Smith, and on this account the species stands under that generic name in his lately published "List of Lepidoptera."

Chipeta, n. gen.—Labial palpi long, slender, arched on second member, horizontal at end, 2nd member very long, end member short; maxillary palpi small, ocelli distinct; antennæ crenate pubescent. Tongue short, but not obsolete. Forewings long, narrow, oval, 9 veins 5 and 8 wanting, 3 and 4 separate, 10 separate. Hindwings 7 veins, 2 at angle, 3 and 4 stemmed, 5 wanting, 8 distinct. Near to *Tampa* Ragonot; the generic name from Chipeta, wife of Ouray, Chief of the Ute Indians. In Dr. Smith's List of Lepidoptera the genus is under the name *Osceola*, but that is preoccupied, so I change it to *Chipeta*.

Chipeta perlepidella, n. sp.—Expands 22 mm. Palpi, head and thorax dark red. Abdomen yellowish fuscous, with a reddish tinge. Forewings with costa narrowly white, the line not reaching apex, the rest of the wings bright reddish, quite even in colour. Hindwings white, narrow; pointed. Fla.

Lipographis subosseella, n. sp.—Expands 16 mm. Head, thorax and forewings of a dull white colour, rather evenly washed with light fuscous, giving a dirty white appearance, and this all sparingly mixed with blackish scales; line of forewings indistinct, shown rather by a darkening of edges which give a blackish blotch by basal line near inner margin and an even subterminal dark rather broad band. Two discal dots also indistinct. A marginal line of indistinct black dots. Hindwings fuscous, darkest at edges. Abdomen light fuscous, the segments blackish dorsally, especially anally, the extreme end yellowish. Bahama Is. West Indies.

This species, while not North American, is described, as I have given it to Mr. Ragonot under this MS. name. The generic reference is by Mr. Ragonot.

Paralipsa decorella, n. sp.—Expands 27–30 mm. Palpi and head whitish, collar whitish, thorax light gray, abdomen fuscous gray, antennæ whitish at base becoming fuscous outwardly; forewings gray costally, gray washed with fuscous posteriorly; lines quite indistinct, the basal near middle of wing and strongly dentated, the outer scarcely evident; a black stripe from base at middle reaching out to basal line and much broadening there, forming a diffuse blackish spot along costa towards apex, and the marginal space much stained with dark fuscous; a black marginal line, fringes fuscous. In some specimens there is on the basal and middle fields a faint reddish shading, especially posteriorly. Hindwings light fuscous, beneath nearly even fuscous on all wings. Along costa in ♂ there is concealed a very large tuft of cottony hair, the hair being nearly a quarter of an inch in length, very fine and very dense.

My specimens are from Buffalo, N.Y., and London, Ontario.

Loxostege baccatalis, n. sp.—Expands 22–24 mm. Palpi rather short, dark buff in colour stained with blackish beneath on first and second segments with rather long pure white scales. Front and antennæ buff, slightly stained with blackish; the clypeal tubercle broad, conical, not much extended. Thorax whitish below in front, dull golden yellow above, sometimes slightly shaded with fuscous. Forewings dull golden yellow generally, somewhat washed with fuscous, a little more decidedly on the central field; lines as such indeterminate. On each wing are three sets of dull white spots, all edged with blackish, the outer and inner sides being the heavier, and these in part at least being the broken remnants of the cross lines. All the spots are behind the subcostal space, and in each case the anterior spot begins on that space. The first set is basal, the anterior spot being oval-triangular on outside of basal line, and the posterior larger, quadrate, on the inside of the basal line, not extending beyond the middle of wing. The second set is discal, the anterior quadrate oval, representing the discal spot, the posterior larger, quadrate reaching to vein 1. The third set is on the outer line, the anterior largest of all the spots, quadrate, on inner side of the line. The next is below on outside of line, made into two or three by the veins, which are fuscous, flattened basally, rounded conical outwardly, the dark edging forming rounded dentations. The third spot is inside the line, posterior to the last, subquadrate rather large, reaching vein 1. Hindwings yellowish, becoming quite whitish translucent basally, and on middle field cross lines quite distinct, the first near the middle, the outer not far removed, and having at the middle three white spots long oval, divided by the veins, and strongly edged all around with blackish. Wings beneath as above, less sharply determinate in markings, the yellow more whitish and more washed with fuscous. Abdomen yellowish, with a narrow line, more whitish on each segment. In the male the abdomen is slender, extended, the genital armour protruded, and with a long tuft of hair on either side of last segment. Blanco Co., Central Texas. Specimens taken in April, July, September and October. The single specimen taken in April is darker than the rest, and there is some variation among all in the size of the whitish spots. The generic reference is from Dr. Smith's new List of Lepidoptera, and so on Dr. Fernald's authority.

NOTES ON NORTH AMERICAN TACHINIDÆ, WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.—Paper V.*

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

The Tachinidæ herein described and mentioned are from the more northern parts of the U. S.; from Colo., Kan., Dakota, Iowa and Minn. to Ills., Mich., Pa., N. Y., N. H. and D. C.

Blepharipeza bicolor, Mcq

A small specimen from Dixie Landing, Va. (D. C.), Sept. 21, is evidently this species. It measures 9 mm.

Blepharipeza exul, n. sp., ♀.

Eyes light brown; frontal vitta light brown, with a reddish tinge; sides of front cinereous; face and cheeks silvery; facial ridges bristly half way up, sides of front bristly, sides of face bristly below frontal bristles; antennæ blackish, first two joints and base of third rufous, arista blackish; third antennal joint little more than twice as long as the

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* Paper I. was published in Proc. Ent. Soc., Wash., II.; papers II. and III. in Trans. Am. Ent. Soc., XVIII. and XIX.; paper IV. in Ent. News, III.

elongate second joint; proboscis blackish, labella large, brownish; palpi rufous black bristly, rather stout; occiput silvery-gray, hairy. Thorax blackish, faintly silvery-pollinose, with five narrow black vittæ, the outer pair obsolete in front; scutellum brownish-rufous, as is also the thorax on hind margin and sides posteriorly. Abdomen dark rufous, a median broad vitta and posterior margins of segments black. Legs black, tibiæ rufous, femora silvery on outside, especially front ones; claws and pulvilli somewhat elongate, the pulvilli tawny-whitish. Wings grayish-hyaline, yellowish-brown at base; hind cross-vein strongly sinuate; tegulæ brownish-fuscous, halteres tawny-brownish.

Length of body, nearly 10 mm.; of wing, 9½ mm.

Described from one specimen; New Hampshire (C. W. Johnson).

This species differs from *B. adusta* principally in the rufous basal joints of antennæ, the rufous tibiæ, and the brownish wing bases and tegulæ. Seven specimens from N.Y. (Comstock) are perhaps this species. They are 10–13½ mm.; the antennæ are black, inclining to rufous at base; the frontal vitta dark brown; the cheeks, sides of face and front much less bristly. The females have two orbital bristles, and the males have the claws well elongated.

Gonia sagax, n. sp., ♂.

Eyes brown; front almost one-half width of head; sides of face, cheeks and whole front, including frontal vitta, light golden-yellow; facial depression silvery-white and about two-fifths width of face; vibrissæ decussate, inserted a little above oral margin; sides of face, cheeks and front covered with bristly hairs; antennæ nearly as long as face, second joint rather short, third about five times as long as second, first two joints same pale yellow as front, third joint clear orange-rufous; arista brown, second joint distinctly longer than last joint; proboscis black, tip and base brownish; palpi yellow, curved and thickened at tip; occiput blackish, except vertical area yellow, thickly clothed with yellowish-gray hair. Thorax shining metallic-black, posterior corners and margin and scutellum testaceous, scutellum with four pairs of macrochætæ besides a discal pair. Abdomen shining black, bases of segments two to four silvery-white, or slightly golden in some lights, most broadly on anal segment; first and second segments with a lateral macrochæta and a median marginal pair, third with eight or more marginal, anal with several macrochætæ. Legs black, foot-claws and pulvilli nearly as long as last tarsal joint, pulvilli smoky. Wings grayish-hyaline, costo-basal portions broadly yellowish; tegulæ nearly white, halteres brownish-yellow.

Length of body, 10½ mm.; of wing, 7½ mm.

Described from one specimen; Ames, Iowa (Osborn).

Pseudogonia ruficauda, n. sp., ♂.

Eyes light brownish; front more than one-third width of head, frontal vitta dark brownish; sides of front brassy-golden, face and cheeks silvery-white, epistoma yellowish, antennæ and arista deep black, first two antennal joints rufous; proboscis black, tip and base brownish, palpi pale rufous; occiput cinereous, thickly yellowish-gray, hairy. Thorax black, silvery-pollinose, leaving four black vittæ, humeri and pleuræ silvery with a brassy tinge; scutellum testaceous, somewhat silvery. Abdomen black, first segment slightly silvery behind, second and third segments more or less thinly and anal segment thickly brassy-pollinose, tip of anal segment rufous; first segment with one lateral macrochæta, second with one lateral and a median marginal pair, third with a marginal row of ten or twelve, anal with a marginal row of about as many; hypopygium black, hairy. Legs black, front femora thick silvery on underside, all femora bristly, middle and hind tibiæ with strong macrochætæ, claws and pulvilli elongate, pulvilli tawny-fuscous. Wings grayish-hyaline; veins on costo-basal portions, also middle portion of marginal cell, pale yellowish; tegulæ white, halteres fuscous.

Length of body, 11 mm.; of wing, 8 mm.

Described from one specimen; Brookings, So. Dakota (J. M. Aldrich).

I refer this species to *Pseudogonia*, Br. & v. Bgst. The second antennal joint is elongate, third two and a half times as long as second; arista geniculate, second joint elongate; sides of face bristly, as in *Cnephalia* and *Gonia*, but the second aristal joint less than half as long as third; proboscis longer than height of head, slim; palpi long, slender basally, thickened apically.

A ♂ specimen from N. Y. (Comstock) differs chiefly in the anal segment being wholly black at tip, not at all rufous; the third antennal joint blackish, rufous at base, arista brown. If these differences are, as I believe, entitled to specific value, the species may be known as *P. obsoleta*. It is 11 mm. long.

Siphoplagia anomala, Twns., Trans. Am. Ent. Soc., XVIII, p. 350.

This species was described from Southern New Mexico. A ♀ specimen from So. Ills. (Robertson) proves to be the same species. It is 8 mm. long.

Plagia americana, v. d. Wulp, Biol. C.–A. Dipt., II., p. 102, pl. 3, f. 19.

A specimen from N. Y. (Comstock) agrees with v. d. Wulp's description in all except that the third vein of the wing is bristly only to small cross-vein, not beyond it. The wing, however, differs from the figure in the origin of the hind cross-vein being considerably below instead of opposite the small cross-vein. I am unwilling to consider it a distinct species without further proof, as it otherwise agrees so closely with the description, though the difference in venation can hardly be varietal.

Plagia aurifrons, n. sp., ♂.

Eyes light brown; frontal vitta and sides of front golden, insensibly shading on sides of face into the silvery of the face and cheeks; front one-third width of head; three orbital bristles, the hindmost one weaker, frontal bristles descending about half way down sides of face; antennæ and arista black, the second antennal joint silvery, the third twice as long as second; proboscis brownish; palpi yellowish rufous, blackish at base; occiput cinereous, gray-hairy. Thorax black, slightly silvery, with five more or less distinct blackish vittæ, the middle one obsolete anteriorly; scutellum black, more or less silvery. Abdomen shining black, bases of segments two to four broadly but faintly silvery, the silvery becoming most distinct when viewed very obliquely; first segment with a lateral macrochæta and bristles, second with a lateral one and median marginal pair; third with about eight marginal, the median two more removed from margin; anal with a median discal pair, a sub-marginal sub-lateral pair, and a marginal row. Legs black, femora and front tibiæ silvery on outside, claws and pulvilli elongate, the pulvilli smoky whitish. Wings grayish-hyaline, yellowish-fuscous along veins on costal half, first vein bristly its whole length, third bristly to small cross-vein, fourth vein with slight wrinkle at bend; hind cross-vein nearly parallel with inner-margin of wing, but its origin considerably behind the point opposite small cross-vein; tegulæ whitish; halteres pale rufous, blackish in middle.

Length of body, 7 mm.; of wing, 5⅔ mm.

Described from one specimen; Pennsylvania, June 4 (Johnson).

Trixa gillettei, n. sp., ♂.

Eyes brownish; frontal vitta brown, narrowed posteriorly; front very narrow behind, wide before; face, cheeks and sides of front silvery-pollinose, latter shading to darker, cheeks with a brown area anteriorly; antennæ and arista blackish, first two antennal joints and base of third rufous; second antennal joint bristly, with a long bristle on front edge, third joint as long as second; proboscis as long as height of head, rather slim, blackish; palpi slender, brownish, rufous at tip, bristly; occiput silvery, clothed with yellowish hairs. Thorax black, slightly silvery, with four (?) indistinct black vittæ; scutellum black, slightly silvery. Abdomen black, more or less deeply silvery-pollinose according to lights, except first segment; first two segments with a lateral pair of macrochætæ, and a median discal and marginal pair; third with a median discal pair, and a marginal row; anal with a more or less regular discal and marginal row. Legs black, claws and pulvilli very elongate; pulvilli tawny-fuscous, claws brown at base, black at tips. Wings grayish-hyaline, tawny at base, without costal spine; tegulæ nearly white, halteres rufous or brownish.

Length of body, 10 mm.; of wing, 9 mm.

Described from one specimen; Colorado (C. P. Gillette).

This species differs from both of Mr. v. d. Wulp's Mexican species described in the Biologia Centrali-Americana, *T. obsoleta* and *T. differens*, by having discal macrochætæ on the abdomen.

Miltogramma kansensis, n. sp., ♂.

Eyes light reddish-brown; frontal vitta nearly obsolete, concolorous with front; sides of front, face and cheeks silvery white, the front shading to dark, epistoma and facial depression more or less yellowish; three orbital bristles, continued in front by a row of minute bristles; antennæ orange rufous, third joint about one and a half times as long as second, arista black; proboscis elongate, fully as long as height of head, rather slender, black, base and tip brownish, labella developed; palpi elongate, yellow, filiform, hardly at all thickened; occiput cinereous, black hairy. Thorax silvery, with three blackish median vittæ placed closely together, the middle one obsolete in front, and two heavier vittæ outside them; scutellum black, silvery pollinose. Abdomen red, a median triangle on first segment and a large triangle extending from median portion of base of second to posterior lateral corners of third segment black, anal segment black; second and third segments silvery-white pollinose basally, anal segment wholly so; first two segments without macrochætæ, third and anal with a marginal row. Legs black, femora silvery on outside, claws and pulvilli quite elongate, latter tawny. Wings almost hyaline, tegulæ white, halteres pale yellowish.

Length of body, 8 mm.; of wing, 5⅓ mm.

Described from one specimen; Kansas, June.

Metopia luggeri, n. sp., ♀.

Eyes light brown; front extremely prominent, frontal vitta obsolete before, blackish behind, the sides of front abruptly black behind and pure silvery-white before; face and cheeks silvery-white; antennæ and arista black, third antennal joint very long, fully five times as long as second, nearly reaching epistoma; proboscis blackish, labella brownish, palpi black; occiput cinereous, thinly black-bristly. Thorax black, thinly silvery-white pollinose, with four black vittæ: scutellum black, slightly silvery. Abdomen black, almost wholly silvery-white pollinose, except first segment and hind margins of others; first two segments with a median marginal pair of macrochætæ, and some lateral bristles; third segment with a lateral pair and a median marginal pair; anal segment with a marginal row. Legs black, femora more or less silvery-pollinose, claws and pulvilli very short. Wings grayish-hyaline, tegulæ whitish, with rust-yellow borders, halteres rufous.

Length of body, 5½ mm.; of wing, 4½ mm.

Described from one specimen; Minn. (Lugger).

Thryptocera americana, n. sp., ♀.

Eyes bare, light brownish; front about one-third width of head, frontal vitta light yellowish; frontal bristles descending a little below base of antennæ, four posterior pairs directed backward, two orbital bristles; face, cheeks and sides of front silvery-white, the sides of face extremely narrow, the facial ridges bare except a few bristles next vibrissæ, the latter quite strong and inserted exactly on oral margin; antennæ as long as face; third joint very wide, rounded, and about two and one-half times as long as second, first two joints light rufous, third joint light brown; arista somewhat rufous, brownish at tip, more or less geniculate, 3-jointed, second joint elongate; proboscis short, fleshy, pale yellowish, labella large; palpi pale yellow, rather long, curved, thickened distally; occiput cinereous above, pale yellowish below, sparsely bristly. Thorax silvery cinereous, with two narrow concolorous median vittæ reaching scutellum, humeri and pleuræ silvery-white ; scutellum pale testaceous. Abdomen pale yellowish rufous, silvery-pollinose, with a median black vitta which widens over most of third segment and all of anal ; second segment with a lateral macrochæta and a median marginal pair, third and anal segments with a marginal row ; venter pale yellowish at base, darker toward anus. Legs pale yellowish, tarsi blackish, femora and tibiæ hairy and slightly bristly ; claws and pulvilli very short. Wings grayish-hyaline; first, third and fifth veins spined their whole length, except tips of two latter ; apical cell narrowly open exactly in tip of wing, fourth vein roundly curved at bend, hind cross-vein slightly nearer to small cross-vein than to bend of fourth ; tegulæ nearly pure white, halteres yellow.

Length of body, 4 mm.; of wing, 3½ mm.

Described from one specimen ; Washington, D. C., August.

Myobia diadema, Wd.

Mr. v. d. Wulp (Biol. C.-A. Dipt., II.) describes this species as having the epistoma "slightly prominent". A ♂ specimen from N. Y. (Comstock), which I refer to this species, has the front golden like the thorax, the face silvery, and the oral margin or epistoma is what I should call "very prominent".

[TO BE CONTINUED.]

GETTING BUTTERFLY EGGS.

BY W. G. WRIGHT, SAN BERNARDINO, CAL.

It is generally understood, I believe, that to get eggs the requisite plant must be also enclosed in the gauze bag with the female insect. Such is often, but not always the fact, and it will lighten the labours of the biologist and simplify his methods if a more correct statement be made. That one genus of butterflies should not use or require living plants to receive their eggs, while others will fret and die without ovipositing if their peculiar plant be withheld, indicates a relationship, or gives a hint as to grouping of genera upon natural lines. But if so, it plays havoc with existing groupings, and will cause the arbitrary to give place to the natural when these things become better understood.

The genera of butterflies, with the living forms of which I am acquainted, and of which the females do not require plants in ovipositing, are as follows :—Parnassius, Argynnis, Euptoieta, Neonympha, Cœnonympha, Hipparchia, Satyrus, Chionobas, and in part, Chrysophanus. Females of all other genera, so far as I know, will die rather than oviposit when their respective plants are not present, and it is necessary also that the plants be bright and fresh ; when even slightly wilted the insects will ignore them, and die without ovipositing.

Having thus stated the matter generally, let me now give more in detail the habits of some typical species of both groups as to ovipositing, and my experiences in getting eggs from them. *Parnassius Hermodur*, when ovipositing, alights upon the ground among the grass and crawls about in a restless way at random, dropping egg after egg as they mature indiscriminately upon the bare ground or dead rubbish or wherever they may chance to fall. When thus engaged she is as readily approached as if feeding on flowers. When the ♀ is confined in a bag she is not unruly but remains rather quiet, scattering her eggs about, singly, as they ripen, and most of the eggs attach to the gauze of the bag, to which they adhere but slightly. I have never observed ovipositing of *P. Smintheus*, but believe it to be identical with *Hermodur*, as related. The habits of all the other genera named are the same in this particular, that the eggs are laid singly, and not in masses, as is the habit of some genera.

Different species of Argynnids have different methods of ovipositing, but none that I know of require a plant. *A. Callippe* goes crawling about on the ground and under bushes like a Parnassian, and oviposits by extending the abdomen down among the dead twigs and dry leaves like a grasshopper. This habit renders the species somewhat difficult to manage in a bag, as the eggs will be pushed down into the ground if possible. Other species, as *Semiramis*, oviposit on the wing without ever alighting, but hovering over suitable places and dropping the eggs at pleasure. The reason for this peculiar habit seems to be to avoid small lizards, which abound and which are alert to seize any flying insect. *Semiramis* is a difficult species to manage in confinement. Lively, vigorous and restless, they take confinement hardly. When ovipositing in a gauze bag they drop the eggs at random, and only a few become attached to the gauze, but most of them drop to the bottom, where they are likely to be lost unless precaution be taken. *A. Leto* also oviposits on the wing. In 1890 I took a fine ♀ *Leto* near Mt. Shasta, in northern California, and as I was on my journey southward and could not well wait to get eggs in the usual way, I put her in a small tin box without any food or plant except a few blades of grass to serve her as a foothold, and putting the box in a hand-grip carried it home, a distance of 900 miles, and with stops taking five and a-half days. Upon reaching home I opened the box, gave *Leto* sun and air, then fed her with sweetened water, then put her in gauze bag in the open window without any plant in sight or other thing which could remind her of the home she had left so far behind, and she lived several days and gave me a nice lot of fertile eggs. This *Leto* was not fractious, but as she had been shut up in a dark box nearly a week it could hardly be called a fair test. *Leto*, of all Argynnids, is a strong and tireless flyer, vigorous and full of life and activity, and seldom at rest. It is, therefore, but reasonable to suppose that they would rebel if confined. I have had other ♀ Letos in confinement, but out in the open country, and unattended, so that I could not watch them.

Cœnonymphas are very gentle and tractable. They worry but little, and remain very quiet. As the eggs mature and become ready to deposit they are stuck on to the gauze singly, adhering rather firmly. These eggs are rather small, but are safely taken in a coarse netted bag, as they are coated with a glutinous substance, by which they adhere at once to any fibre, and so do not fall away and get lost. The greatest difficulty I have had with Cœnonymphas is in the matter of shade. A little too much shade and she will not lay her eggs ; a little too much sun and she incontinently dies. A piece of thin muslin makes a better shade than a leafy twig.

One would think from the Ornithoptera-like shape of the wings of *Chionobas* that they were of rapid flight, wild, and generally unreasonable. But such is not the case. They are very gentle, flying about but little, and usually returning to the spot they started from, where they settle down again slowly and deliberately. I have found *C. Gigas* to be easily handled in captivity, and have got eggs without difficulty. In the interior of Vancouver Island I took a ♀ upon the top of a high hill, and immediately put her in a bag and laid it down on the grass by the side of a big rock where it would be sheltered from the cold wind, and with no shade from the sun, as it was not hot at that height, and did not go to it again for thirty-six hours. Then, when I went to it I was delighted to see some eggs sticking to the gauze. I could not remain any longer, nor could I return another day. So I took a small tin box and carefully put the bag, insect, eggs and all together in it and tied it to my belt for safety in going away through several miles of dense thicket, and so carried it to my hotel, and thence by rail to Victoria. There I removed the eggs already laid, and placed the bag in the sun in the open window, staying the gauze with pins to keep it steady in the breeze, and so I got another lot of eggs in the middle of the city and without plant or other accessory

Of genus *Chrysophanus* I can speak but with some doubt. Some of the species, as *Gorgon* and *Xanthoides*, appear always to oviposit like the Argynnids upon the ground or among dry rubbish, while *Helloides* always uses a plant, Polygonum aviculare, or in Alaska, where this polygonum does not grow, on some allied plant.

It is thus seen, in short, that these enumerated genera of butterflies which require no plant are most of them easy to manage, and that they can be safely and readily carried a long distance alive and well, and eggs afterward obtained at the home of the student, with little trouble; and that course I advise in all such cases. On the other hand those butterflies which require a plant on which to deposit their eggs are more difficult to handle, because you have not only the butterflies to manage but must provide a fresh plant as well. Yet the difficulties are not so great as is feared. I have found it best, usually, when a suitable ♀ is caught, to tie the bag at once upon a living plant, and then put in it the ♀, and arranging suitable shade leave it for a day or two. These plant-loving butterflies all lay their eggs upon the plant, and not upon the bag, except accidentally. Ants, birds and boys must be guarded against—a trio of terrors. I do not use a large bag; one large enough to hold a quart or two is large enough, either with the plant or without. It is not best that the butterfly should be able to fly about and flutter in its bag; they become much more quiet and reasonable in a small one.

The plant problem is often the one most difficult of solution. Cuttings from delicate plants and such as speedily wilt and perish, can be carried home in a tin box in which they will keep fresh for several days. In that way I have gotten eggs and raised larvæ in my laboratory when the plants grew ten miles away, by going once a week for fresh cuttings. But some cuttings wilt immediately if exposed to the air. To avoid this, put the cuttings into a glass fruit jar, then put in the ♀ and shut it up tight. The closing of the jar prevents the plant from wilting, and by that method I have had good success in getting eggs, notably from the large *Papilio Rutulus*, and in raising larvæ. This *P. rutulus* gave me no end of trouble to get eggs in the open air, but oviposited freely when shut up with willow twigs in a half-gallon fruit jar.

When you know months beforehand what plant you will require, it is best to transplant them to your own grounds, and so have them at hand fresh and growing. By such means I have successfully handled, both for eggs and for larvæ, such species as *Colias eurydice* and *Lycæna sonorensis*, both of which species it would seemingly have been impossible to manage otherwise.

Breeding is the touchstone which tests all species of butterflies, and by it must they all stand or fall. The larva is as much the individual life as is the imago, and we cannot thoroughly know a species unless we have seen its earlier as well as its later stages. Therefore anything which simplifies the management of the early stages is of interest to the biologist.

CORRESPONDENCE.

PROF. J. B. SMITH'S LIST OF LEPIDOPTERA.

Dear Sir : Prof. French in the January number criticises in some points Prof. Smith's catalogue of the Catocalæ in the New List of Lepidoptera. As I was primarily responsible for the list of the Catocalæ, will you and Prof. French kindly allow me an explanation? 1st. Prof. French says "var. *Virens* is not a variety of *Cordelia*, Hy. Edw., but of *Amasia;* and *Cordelia* is not the one figured by Dr. Strecker, pl. 9, f. 12." But *cordelia*, Hy. Edw., is a synonym of *amasia*, Ab. & Sm., and Dr. Strecker's figure is not *amasia*, Ab. & Sm. The error comes from the fact that Abbott & Smith figured two species as ♂ and ♀ of *amasia*, the description being of the upper one only. The insect represented by the lower figure of Abbott & Smith was distributed by Mr. Grote, and figured by Dr. Strecker as *amasia*. Of course the name attaches to the figure described, as afterwards Guenee located it, calling the lower figure *connubialis*. The lower insect I afterwards described as *sancta*, regarding Guenee's name as without authority, as the description was from a picture. Whether I was right or not I will not here say, but the insect distributed by Mr. Grote, and figured by Dr. Strecker as *amasia*, is either *connubialis*, Gn., or *sancta*, Hulst ; while the *amasia* of Abbott & Smith is the *cordelia* of Hy. Edwards, as Mr. Edwards afterwards acknowledged to me. *Virens* was put as a variety of *amasia*, Ab. & Sm., because Prof. French thus located it, and I supposed he meant *amasia*, Ab. & Sm. 2nd. Prof. French says "there is no good reason for separating the two forms of *retecta*." I am not sure what he means by the "two forms of *retecta*;" but if he means *retecta*, Grt., and *luctuosa*, Hulst, then, in view of what he says after, *luctuosa* becomes a variety of *retecta*, Grt. 3rd. Prof. French says "*Flebilis* is not a variety of *retecta*," etc. "Dr. Strecker's figure, pl. 9, f. 4, is not *flebilis*, but a small form of *Desperata*," etc. Dr. Strecker does not call figure 4 *flebilis*, but a variety of it. It is, however, except in the black dashes, as near as can be the exact counterpart of pl. 9, fig. 3, which is *flebilis*, taken from Mr. Grote's type. Also these two, save in the black dashes, are the counterparts of pl. 9, fig. 2, which is *retecta*, and which is from Mr. Grote's type. Having seen the types of both *retecta* and *flebilis* I can bear witness that the figures are very excellent. Mr. Grote had among his types of *retecta* one or more specimens of *luctuosa*, Hulst, but his description is of the form figured by Dr. Strecker. 4th. I am glad to learn more of *Ululume*, Streck. I have seen the type, have one of the specimens from which the description was made, and so know the insect. At the time of publishing my synopsis in the Brooklyn Bulletin, Vol. VII., 1884, pp. 13–56, I regarded it as a variety of *lacrymosa*, as did also Dr. Strecker. Let me add that very few of all the so-called varieties of the U. Catocalæ are varieties in the scientific sense. They are simply colour variations, and the continuance of their names is, in the majority of cases, only a convenience, and without scientific authority. GEO. D. HULST, Brooklyn, N. Y.

SECTION F OF THE A. A. A. S.

Dear Sir : In the January (1892) number of the Botanical Gazette, Dr. B. D. Halsted, Secretary of Section F of the Association, suggests the formation of a Botanical Section, to be separated from Section F. This is a matter in which entomologists have some interest, and concerning which it might be well to have an expression of opinion. All who have attended recent meetings of the American Association must have noticed what a remarkable development of interest there has been in both botany and entomology, and how crowded were the programmes, not only of Section F, but of the Clubs. At the Washington meeting the writer was on the Sectional Committee, which passed on the papers offered, and even after excluding all of doubtful value or interest, it left so many that a proper presentation was out of the question. A most interesting series of papers on parasitism in insects was read at breakneck speed, and not a word of discussion was allowed. I myself had three papers, for which I had prepared charts in illustration, and which presented the results of original work. I barely had time to hurry through the abstracts, and could not even explain my charts. The botanists occupied fully one-third of the time of Section F, and had a large programme for the Club besides. The entomologists had many papers before the Club which were well worthy of presentation to Section F. Botany is quite sharply separable, has a sufficient number of members to present a full programme as a section, and would leave Section F for zoology in general with more time for the proper discussion of papers. As matters now stand, papers are grouped—botanists desert Section F when entomological papers are read, and entomologists usually do as much when botanists hold forth. In the orderly evolution of the Association botany is entitled to a separate section, and entomologists should aid the botanists in securing the necessary action at the next meeting.

JOHN B. SMITH, New Brunswick, N. J.

NOTES.

ADDITIONAL NOTE ON AMBLYOPONE PALLIPES, HALD.

On page 138, Vol. XXIII., is mentioned the finding, in rotten logs, of colonies of this species. The fate of the specimens taken on 30th April may be related. Unfortunately the individuals then taken were not counted, but they consisted of workers and larvæ, the latter being more numerous. The box was examined on 1st June and it was found that many of the larvæ had formed cocoons, and that the remainder were feasting on a green caterpillar, which had been dragged down into the nursery. The larvæ were thickly scattered over it, evidently sucking the juices from it, and it was much shrunken. On 21st June another examination was made and a census taken of the inhabitants, which numbered 27 adults (all workers), 23 pupæ (in cocoons) and 48 larvæ. There were also a number of empty cocoons. On 5th July the numbers were reduced to 23 workers, 11 cocoons and 15 larvæ, and, what was a surprise to me, about 30 eggs, cylindrical in shape, with rounded ends and about twice as long as wide. On 13th July there were 23 workers, 7 cocoons, 13 larvæ and about 15 eggs. When I left home shortly after this the box was placed outdoors, and during my absence the insects all died or wandered off. I was disappointed in not obtaining specimens of the ♀ and ♂, and regret that the colony was not housed so that continuous observations could have been made of the inmates and the doings.

W. HAGUE HARRINGTON, Ottawa.

Mailed Marcd 9th.

The Canadian Entomologist.

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NOTES ON NORTH AMERICAN TACHINIDÆ, WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.—PAPER V.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

Loewia ruficornis, n. sp., ♂.

Eyes cinnamon brown; frontal vitta brown, much narrowed posteriorly, front at narrowest point about one-half its width at vertex; sides of front, sides of face and facial depression black, thinly silvery-pollinose; cheeks blackish posteriorly, thinly silvery, the pregenal area very broad, brown, extending upward between sides of face and facial depression; antennæ and arista rufous, third antennal joint little more than one and a half times as long as second, with a somewhat darker shade on outer side; proboscis brownish, palpi rather fuscous, tips rufous; occiput black, black-hairy Thorax and scutellum shining black, black-hairy and bristly. Abdomen shining dark metallic-green; second segment with a median marginal pair of macrochætæ, third with six or more marginal, anal with about six marginal; hypopygium rather exserted, concolorous. Legs black, knees slightly rufous, front femora bristly; claws and pulvilli elongate, pulvilli smoky-whitish. Wings slightly grayish, nearly hyaline, costo-basal portion and veins golden; tegulæ rather smoky-golden, translucent; halteres clear yellow.

Length of body, 6½ mm.; of wing, 5½ mm.

Described from one specimen; Constantine, Mich., August 27. This species seems to connect the genera *Loewia* and *Ennyomma.* The species of *Loewia* usually have the eyes contiguous in the male, while in this species they lack considerably of meeting, and the apical cell, though it cannot be said to be open, is rather widely closed in margin, if the expression may be allowed. In *Ennyomma* the apical cell is open.

Loewia nigrifrons, n. sp., ♂.

Differs from *L. globosa* Twns. (Ent. News, III.) as follows: Sides of front and sides of face shining black, not silvery; facial depression slightly silvery; pregenal area light-brownish; proboscis and palpi blackish.

Wings smoky golden, all except internal border; tegulæ golden fuscous, halteres concolorous.

Length of body, 5 mm.; of wing, 4½ mm.

Described from one specimen; So. Illinois (Robertson).

Ennyomma clistoides, Twns. Trans. Am. Ent. Soc., XVIII, p. 371.

A ♂ specimen from So. Dakota (Aldrich), August 12. Measures 7½ mm.

Clista americana, n. sp., ♀.

Eyes brown; frontal vitta dark brown, blackish, averaging one-third width of front, front averaging one-third width of head; sides of front, sides face and facial depression black, thinly silvery-pollinose; cheeks posteriorly black, thinly silvery, rest included in the large brown pregenal area, an angle of which runs upward between sides of face and facial depression; sides of face fringed with bristles on inner border, cheeks on lower border; antennæ entirely rufous, third joint about twice as long as second, arista brownish; proboscis and palpi brown or blackish, the proboscis fleshy, not as long as height of head, the palpi curved and thickened at tip; occiput black, black-hairy. Thorax and scutellum shining black, the thorax in front slightly silvery, leaving three black vittæ which become lost near suture. Abdomen shining black, with a hardly greenish reflection, broad, flattened, rounded; first two segments with a lateral and a median marginal pair of weak macrochætæ; third with about eight marginal, and anal about six marginal macrochætæ of normal size. Legs black, claws and pulvilli only a little elongate, pulvilli smoky-yellowish. Wings grayish-hyaline, base and veins yellow; tegulæ brassy-yellow, front scales white on outside, the rest transparent; halteres yellow, tinged with rufous toward base.

Length of body, 6½ mm.; of wing, 5½ mm.

Described from one specimen; So. Illinois (Robertson).

Tryphera americana, n. sp., ♀.

Eyes bare, brownish; front more than one-third width of head, frontal vitta velvety brown; frontal bristles descending to base of third antennal joint, vertical bristles strongest, and with three next pairs directed backward, two orbital bristles; sides of front shining black; facial depression and sides of face black, somewhat silvery, epistoma pale luteous; cheeks shining black, anteriorly somewhat rufous; facial ridges bare; vibrissæ decussate, inserted on oral margin; antennæ rufous, more or less blackish, third joint blackish-brown in some lights, fully two and one-half times as long as second, somewhat widened; arista brown, 3-jointed, often somewhat geniculate, second joint slightly elongate ; proboscis short, fleshy, dark brown ; palpi yellow, a little thickened at tip ; occiput shining-black, somewhat bristly. Thorax, scutellum and abdomen wholly shining greenish-black, scutellum with a weak apical decussate pair of bristles, a sub-apical decussate (?) pair of macrochætæ, and two lateral pairs. First abdominal segment with one or more lateral macrochætæ ; second with a lateral marginal one, a lateral discal pair, a median discal and a median marginal pair ; third with a lateral discal pair, three lateral marginal ones, a median marginal and a median discal pair ; anal segment with a discal row and a few marginal macrochætæ. Legs black, claws and pulvilli short. Wings grayish-hyaline, basal portion and costal border yellowish, with small costal spine, third vein bristly at base ; apical cell closed in tip of wing, fourth vein curved, hind cross-vein nearer curve ; tegulæ pale tawny, halteres brownish.

Length of body, 3½ mm.; of wing, 3 mm.

Described from one specimen ; So. Illinois (Robertson).

Tryphera polidoides, n. sp., ♀.

Eyes light brown, thinly hairy ; frontal vitta light brown ; apparently three orbital bristles amongst other weaker bristles ; sides of front shining black ; sides of face and facial depression black, thinly silvery, epistoma paler ; cheeks and occiput shining black, with slight greenish lustre, hairy, cheeks bordered anteriorly with a narrow brownish prægenal area ; antennæ and arista black, first two antennal joints rufous, third joint about three times as long as second, moderately wide ; proboscis brownish, palpi yellowish. Thorax, scutellum and abdomen dark metallic green ; first segment with a lateral marginal macrochæta ; second with a lateral discal and marginal one, or pair, and a median discal and marginal pair ; third with a lateral discal and median discal pair, and a quite distinct marginal row ; anal with a discal and marginal row. Legs blackish, claws and pulvilli only a little elongate, pulvilli tawny-whitish. Wings slightly grayish, nearly hyaline, veins yellow, third vein spined at base ; tegulæ dull whitish, translucent ; halteres brownish.

Length of body, 5⅓ mm.; of wings, 3⅔ mm.

Described from one specimen ; N. Y. (Comstock).

CLISTOMORPHA, n. gen.

Much the general form of *Clista*, but greatly resembling *Hyalomyia* in the form of the head. Belongs in *Phytoinæ*. Head in general profile triangular, the fronto-facial profile sinuate in outline, bulging above. Front not prominent, very narrow in ♂, the eyes closely approximated in front of ocelli but not contiguous, front a little widened at vertex, more so at base of antennæ, face widening at same angle, about one-half width of head at widest which is the lowermost portion; frontal bristles weak, in single row, terminating at base of antennæ, directed forward and inward, decussate, except vertical bristles which are directed backward and hardly stronger than the others; no orbital bristles (♂). Face not receding, rather advancing, nearly perpendicular, epistoma prominent, oral profile long; facial depression about four-fifths width of face, rather triangular in ouline, very shallow; facial ridges bare except some very small bristles just above vibrissæ, only a very little constricted a good distance above oral margin where the weak non-decussate vibrissæ are situated, the latter being distinct from the shorter bristles below which make up the uniform row on the cheek borders; sides of face very narrow, bare; cheeks very narrow, bare. Eyes bare, descending far below vibrissæ and about as low as oral margin. Antennæ inserted nearly on a line drawn through middle of eyes, short, about three-fifths length of face, third joint hardly longer than second, elongate-round; arista bare, apparently only 2-jointed, basal joint short, terminal joint thickened at base. Proboscis nearly as long as height of head, rather slender, labella somewhat developed; palpi small, slender, filiform, but slightly thickened at tip. Thorax not so wide as head; scutellum with an apical decussate, and two lateral pairs of macrochætæ. Abdomen rather wider than thorax, much rounded, somewhat flattened, but convex above, first segment not shortened; macrochætæ weak, discal and marginal; hypopygium concealed. Legs not long, not stout, very little bristly, claws and pulvilli of ♂ only a little elongate. Wings much longer than abdomen, without costal spine, third vein without bristles at base; apical cell closed in border at tip of wing, fourth vein curved, apical cross-vein nearly straight; hind cross-vein nearly straight, about in middle between small cross-vein and bend of fourth. Type *C. hyalomoides*, n. sp.

Clistomorpha hyalomoides, n. sp., ♂.

Eyes cinnamon brown; frontal vitta velvet-black, narrowed posteriorly; sides of front, face and cheeks silvery-pollinose; antennæ and arista blackish, second antennal joint more or less brownish; proboscis brown, palpi pale tawny; occiput black, silvery below. Thorax soft black, humeri broadly silvery-cinereous, continued backward on sides of thorax to scutellum, pleuræ silvery; scutellum black. Abdomen black; second segment narrowly at base and with median line, third more broadly at base and broadest on sides and in middle, and anal almost wholly except tip, silvery cinereous ; macrochætæ weak and more or less bristle-like, first segment with a median marginal pair, second with a median discal and marginal pair, third with a median discal pair and a marginal row, anal with a marginal and two discal rows. Legs blackish, femora more or less brown, claws and pulvilli but little elongate. Wings grayish-hyaline, very faintly tawny at base, veins brownish: tegulæ smoky yellowish-gray ; halteres rufous, knobs flesh-coloured.

Length of body, 5½ mm.; of wing, 4½ mm.

Described from one specimen ; N. Y. (Comstock).

Phyto senilis, n. sp., ♂.

Eyes brown ; frontal vitta velvet-blackish ; sides of front black, more or less silvery-pollinose ; face and cheeks blackish, silvery-pollinose ; antennæ and arista blackish, first two antennal joints rufous, sometimes also base of third ; third joint hardly one and one-half times as long as second ; proboscis brown, palpi yellow ; occiput blackish, black-hairy. Thorax and scutellum shining black, with an opaque more or less distinct median pair of vittæ lost at suture. Abdomen black, hairy ; first three segments with a marginal row of macrochætæ, anal segment tipped with weaker ones ; hypopygium rather exserted. Legs black, femora hairy, tibiæ bristly, claws and pulvilli elongate, pulvilli tawny fuscous. Wings grayish-hyaline, basal portions and veins pale tawny ; costal border of wing swollen on second costal cell, costa drawn in at termination of auxiliary vein ; tegulæ whitish, margins yellow ; halteres blackish.

Length of body, 6½ mm.; of wing, 5½ mm.

Described from one specimen ; N. Y. (Comstock).

Macquartia johnsoni, n. sp., ♂.

Eyes light brown, rather thickly hairy ; frontal vitta black, about one-third width of front, narrowing behind as front grows narrower, the front about one-third width of head before ; frontal bristles strong, not descending below base of antennæ, three posterior pairs directed backward, decussate except second pair divergent, others directed forward and decussate ; two orbital bristles ; vertex golden ; sides of front, face and cheeks silvery-white, not hairy nor bristly ; facial ridges bare, vibrissæ strong, decussate, inserted on oral margin ; antennæ blackish, first two joints and base of third rufous, third joint about two and a half times as long as second ; arista blackish, pubescent basally ; proboscis blackish, labella and palpi rufous yellow ; occiput silvery or brassy pollinose, golden above, thickly gray hairy. Thorax brassy-golden pollinose, with two median vittæ which become obsolete about half way between suture and scutellum, and a heavier lateral vitta which is interrupted at suture; scutellum brassy pollinose. Abdomen shining black, bases of second to anal segments broadly silvery pollinose with a brassy tinge, also sides of first segment; first segment with a lateral macrochæta and bristles, and a median marginal pair; second with a lateral one, and a median marginal and discal pair; third with a median discal pair and a marginal row of about eight; anal segment with a discal and marginal row. Legs black, tibiæ rufous, bristly, femora silvery on outside, claws and pulvilli quite elongate, pulvilli yellowish. Wings grayish hyaline, tegulæ whitish, halteres yellowish.

Length of body, 8½ mm.; of wing, 7 mm.

Described from one specimen; Penna. (C. W. Johnson).

Polidea americana, n sp., ♂.

Eyes nearly black, pubescent; frontal vitta black, one-third width of front, front one-third width of head; one orbital bristle on left side, none on right; frontal bristles descending below base of third antennal joint; sides of front shining dark green as far down as lowest frontal bristles; sides of face and facial depression silvery-pollinose; cheeks and occiput shining dark green; antennæ and arista deep black, third antennal joint wide, two and a half times as long as second; proboscis brownish, palpi pale rufous, darker at base. Thorax, scutellum and abdomen dark metallic green; first segment with a lateral marginal macrochæta amongst other bristles; second with a median discal and marginal pair, and a lateral marginal and discal one, or pair; third with a median discal and lateral discal pair, and a marginal row; anal with a discal and marginal row; hypopygium somewhat brownish. Legs black, knees hardly rufous, claws and pulvilli only a little elongate. Wings slightly grayish, nearly hyaline, veins yellow, third vein spined nearly or greater way to small cross-vein; tegulæ nearly white; halteres rufous, knobs black.

♀. Differs as follows:—Frontal width about the same, two orbital bristles (only one on right side in one specimen); third antennal joint not widened. Claws and pulvilli not quite so long; front tarsal joints widened.

Length of body, ♂ 6 mm., ♀ 5½ to 5⅔ mm.; of wing, ♂ 4 mm., ♀ 4⅓ to 4½ mm.

Described from one male and two females; Constantine, Mich., August 24. I have also a ♂ from Orono, Maine (Harvey), which I doubtfully refer to this species. It has no orbital bristles, and the apical cell is very narrowly open. It measures 5⅓ mm.

CLERCK'S ICONES.

BY W. J. HOLLAND, PH.D., D.D.

Under the title "*Icones Insectorum Rariorum cum Nominibus eorum trivialibus, locisque e C. Linnæi Arch: R: et Equ: Aur: Syst: Nat: allegatis,*" Charles Clerck, a member of the Royal Academy of Sciences of Upsala, commenced the publication at Stockholm, in the year 1759, of a series of plates intended to illustrate the species of exotic lepidoptera recently named by his distinguished fellow-countryman, the immortal Linnæus.

About a month ago I received from Mr. Felix Dames, the well-known bibliopole of Berlin, a letter informing me that he had succeeded in securing a remarkably fine copy of this exceedingly rare work, which he held at my disposal. I immediately cabled to him that I would become its purchaser. But six or seven copies of the book are known to be in existence, and not all of these in perfect state. The one I own, which has just come into my hands, and which is the only copy which has ever crossed the Atlantic, is in superb condition, and enjoys the distinction of being, with the exception of the copy in the library of the Royal Academy of Sciences at Stockholm, the only example in which there are the plates, so far as published, of the Third Section of the work which Clerck did not live to complete. He died on July 22nd, 1765.

Hagen, in his Bibliotheca Entomologica, states that the work consists of two sections, the first of which, in addition to the title page and dedication, has eight pages of Swedish and Latin text, together with sixteen plates; and the second, in addition to the dedication, contains three pages of text, thirty-eight plates, and an index of three pages. The copy lying before me contains, in addition to the parts described by Hagen, seven plates, numbered from 4 to 10, of which the first two are coloured, and the next to the last (pl. 9) is partly coloured.

The extreme rarity of the book is well known to lepidopterists. Gottlob Wilhelm, in his "Unterhaltungen," Ins. II., page 16, published in 1779, is quoted by Strecker in his "Butterflies and Moths of North America," p. 218, as having described the work in the following terms:—"Fifty-five pages large 4to, a simple register, together with a dedication and preface, compose the whole work, which, at auction, was sold for 600 Swedish dollars." Hagen tells us that the book was distributed by the Queen of Sweden in the form of presentation copies, and that it was never put upon the market, and hence became scarce. Linnæus, in his Systema Naturæ I., ii. p. 535, speaks of it in laudatory terms as "*Clerckii icones insectorum, pulcherrimum opus, quod etiamnunc vidit orbis literatus.*" Prof. Zeller, in the Stettiner Entomologische Zeitung, Vol. XIV., p. 199, after describing at length the longing desires he had felt to get a glimpse of the work, and how at last, through the kindness of Alexander von Humboldt and the Librarian of the Royal Library at Berlin, the wish had been gratified, and how it happened at the same time that he was allowed the use of a mutilated copy belonging to Dr. Herrich-Schaeffer, of Regensburg, goes on to state his disappointment with that part of the work which is devoted to the illustration of the European Geometridæ and Pyralidæ. He says :—"*Welches war aber der Eindruck, den das pulcherrimum opus, als ich es nun endlich vor Augen hatte, auf mich machte? Hatte ich auch keine Bilder wie in* British Entomology *oder wie in der* Exploration Scientifique de l'Algerie *erwartet, so wusste ich mir doch nicht sogleich Rechenschaft zu geben, wie Linné so jaemmerliche Malereien fuer etwas so Herrliches erklaeren konnte. Das ergab sich denn wohl, dass nicht die Abbildungen Europaeischer Nachtfalter sodern die der grossen, bunten Exoten Linnés Augen bestochen und ein so viel sagendes Urtheil hervorgerufen hatten.*" While it is undoubtedly true that the figures of the smaller forms are measurably disappointing, and are not to be for a moment compared with the splendid productions which have come to us in recent years from the press of Europe and America, yet as a whole they compare very favourably with the illustrations given in many of the works of the older authors. They are equal to those given in Drury's illustrations, and are vastly superior to the great majority of the figures given by such an author as Cramer. Zeller calls attention to the fact that there are differences in the two copies which he had under his eye at the time he wrote his critique, due to the work of the colourist. The uncoloured plates in the copy before me explain the manner in which these variations came to take place. The figures prepared by the engraver were simply outlines done in copperplate, and all of the shading, as well as the colouring, was left to the artist who wielded the brush, and who can have had nothing to guide him in his work except the original drawings, or the insects themselves. Under the circumstances it is very plain that minor discrepancies must have inevitably occurred.

The North American insects figured in the work are the following :—

Papilio glaucus, *P. asterias*, figured under the name *P. Ajax*. *Victorina steneles*, *Colænis dido*, *Gyæncia dirce*, figured under the name *Papilio bates*, *Agraulis vanillæ*. *Danais plexippus*. *Deiopeia ornatrix*. *Samia cecropia*, *Pachylia ficus*, *Erebus odorata*. *(sic)*, *Actias luna*, *Nyctalemon lunus*. The latter is common in Jamaica.

The insects figured in the supplementary plates which are found in my copy, and to which there is no reference made by Kirby in his Synonymical Catalogue, are the folllowing :—

PLATE 4.

Fig. 1,	*Papilio (Argynnis) niphe.*	2 figs.	Upper and lower sides.	
" 2,	" *(Precis) almana*, vera.	2 figs.	"	"
" 3,	" *(Grapta) c–aureum.*	2 figs.	"	"
" 4,	" *(Junonia) œnone.*	2 figs.	"	"

PLATE 5.

Fig. 1,	*Papilio (Danais) plexippus.*	2 figs.	Upper and lower sides.	
" 2,	" *(Danais) chrysippus.*	2 figs.	"	"
" 3,	" *(Precis) almana*, XXX.	2 figs.	"	"

(This is the wet season form known by authors as *P. asterie*, L.)

" 4,	*Papilio (Neptis) leucotoe (sic).* *(Athyma)*	4 figs.	Upper and lower sides.

(The two left hand figures represent *Neptis leucothoe*, and the two right hand figures represent *Athyma perius*, which has been confounded by synonymists with the preceding species, which in turn has been unaccountably given by Kirby, who refers to Cramer's figure as a synonym for *N. aceris*, Lep. *Neptis leucothoe*, figured in Cramer, and in the unedited plate of Clerck, whose figure is a good one, is a Celebesian insect.)

PLATE 6.

(Uncoloured.)

Fig. 1,	*Papilio Demoleus.*	2 figs.	Upper and lower sides.	
" 2,	" *Ægistus.*	2 figs.	"	"
" 3,	" *(Delias) pasitea (sic).*	2 figs.	"	"
" 4,	" *(Terias) hecabe.*	3 figs.	"	"

(Two forms of this species are given, one with the black marginal border not quite as broad, nor as deeply sinuate inwardly as the other.)

PLATE 7.

(Uncoloured.)

Fig. 1, *Papilio (Melanitis) leda.* 4 figs. Upper and lower sides.

(The two upper figures represent the form in which the falcation of the primaries is most noticeable, and in which the outer margin of the secondaries is freely produced at the extremity of the third submedian. It may be that the figure was drawn from an African specimen, in which case the form *Banksia* is probably intended to be represented. The lower of the two figures represents a smaller form in which the falcation of the primaries is scarcely perceptible, and the secondaries are rounded posteriorly and not produced. I have such specimens of *Leda* in my collection from Perak and from Kumaon.)

Fig. 2, *Papilio (Precis) lemonias.* 2 figs. Upper and lower sides.
" 3, " *(Mycalesis) mineus.* 2 figs. " "
" 4, " *(Cynthia) alimenia.* 2 figs. " "

(This is not *Hypolimnas alimena*, of which a good figure is given on plate 32, but undoubtedly represents *Cynthia deione.* *Alimenia*, Clerck, must therefore be added to the synonymy of that species. Fig. 5 unnamed, but easily recognizable as *Junonia atlites.)*

PLATE 8.

(Uncoloured.)

Fig. 1, *Papilio Memnon.* 2 figs. Upper and lower sides.
" 2, " *(Euplœa) midamus.* 4 figs. " "

(The two lower figures may represent *E. midamus*, but they have not the exact form of that species, and are too large. There is nothing but an outline. The two upper figures seem to represent *E. Core.)*

PLATE 9.

(Partly Coloured.)

Unnamed, but a fairly good figure of *Attacus atlas.*

PLATE 10.

(Uncoloured.)

Fig. 1, *Papilio Agamemnon.* 2. figs. Upper and lower sides.
(The tailed form of this species.)

Fig. 2, *Papilio*, unnamed.

(The cuts represent the upper and under sides of a specimen of *Papilio Antiphates*, Cram., the tails of which have been cropped off with a scissors. The outline faithfully reproduces the mutilation, so as to render it recognizable by any one familiar with the species.)

Fig. 3, *Papilio panope*. A good outline of the upper and under side of this species.

The only commentary upon the Icones of Clerck which I have been able to find is embodied in the papers of Prof. Zeller, alluded to already in this article, and a paper by Herr Werneburg, published in the Stettiner Entomologische Zeitung for the year 1856, in which the writer undertakes to solve some of the problems as to synonymy, which he regards Prof. Zeller as having left untouched. These all, however, as the comments of Prof. Zeller likewise, relate to the European micro-lepidoptera figured in the work. I may at a later date furnish a paper upon the synonymy of the exotic micro-lepidoptera, in regard to which plainly something remains to be said.

Chancellor's Office, Western University of Pennsylvania,
Feb. 2, 1892, Pittsburgh.

HERMAPHRODITE GYPSY MOTHS.

BY C. H. FERNALD, AMHERST, MASS.

Two specimens of this moth *(Ocneria dispar*, L.) were taken in Medford, Mass., last summer, which are what Ochsenheimer called perfect Hermaphrodites. One is much larger than the other, having an expense of 52 mm., and has the right half of the body, with the wings and antennæ of that side, of the form, colour and markings of the female, while the left side of the body, with its wings and antennæ, are male. The other example has a wing expanse of 39 mm., and is a male on the right side and a female on the left. In both specimens the frenulum is single on the male side, but divided on the female.

As the sexes of this moth differ so strongly in the form and colour of the wings, and in the pectinations of the antennæ, an Hermaphrodite is a remarkable insect to look at, and seems almost to suggest that it is a work of art.

Hermaphroditism in this species is occasionally met with in Europe, several cases being on record in the European journals.

A CLASSIFICATION OF THE NORTH AMERICAN SPIDERS.

BY NATHAN BANKS, WASHINGTON, D. C.

The author has frequently been asked why he did not make a key for the families of spiders. He has answered that a correct key was impossible. But as such questions are getting more numerous, and connected with a desire to know something about spiders, the author has decided to put together what he could as a contribution to the classification of our spiders, principally for the use of those who are unable to obtain the costly works necessary for study.

I shall consider the family the highest group separated by definite characters; not but what certain families possess transition forms, but that the groups higher than the families are not defined by definite characters, but by tendencies. Two groups above the families I shall recognize, the higher the division, the lower the section; the section embracing certain families, the division one or more sections. To these I shall not attempt to make a key, but only designate their general characters and the families which they embrace. In the key for the families I shall be arbitrary; but in the system which follows I shall try to indicate the natural affinities.

The classification of spiders is difficult because of the few characters that can be used. This is not often understood by those who study nsects. Let the entomologist cut off from his insect the wings, the antennæ, one pair of palpi, unite the abdominal segments, obliterate all sutures, and how many characters will he have left! Yet even then he will have far more than the student of spiders can find in his subject.

A few words in explanation of the characters used in the key. The body of a spider is very definitely divided into two parts—the anterior. the cephalothorax; the posterior, the abdomen. Upon the anterior part of the cephalothorax are the eyes; the region they occupy is called the eye region. The eyes are arranged in transverse rows; abbreviations referring to them are frequently used, as S. E. side eyes; A. E. anterior eyes; P. E. posterior eyes; M. E. middle eyes; from these are made compounds, A. S. E. anterior side eyes, etc. Dark coloured eyes are diurnal, light coloured eyes are nocturnal. The region between the anterior row of eyes and the anterior or clypeal margin of the cephalothorax is called the clypeus or fillet. A groove on the meson toward the posterior part of the cephalothorax is called the median groove. There are more or less distinct furrows extending from the groove to the sides, these are the radial furrows; the region of the cephalothorax between the anterior pair and embracing the eye region is called the head or pars cephalica. The mandibles are the anterior pair of mouth-parts; they are two-jointed, the second joint being called the fang, and furnished with the opening of the poison gland. The maxillæ form the second pair of mouth-parts; to the sides of the maxillæ are attached the palpi, which in the adult male have the terminal joint peculiarly modified for sexual purposes. Between the maxillæ and articulated to the sternum is the lip. The sternum is the ventral plate of the cephalothorax, the entire region between the base of the legs. The legs, of four pairs, are numbered from before backward, I., II., etc. The legs are seven-jointed; the joints are called, beginning at the most basal, coxa, trochanter, femur, patella, tibia, metatarsus, and tarsus; in a few peculiar groups there is an eight joint, the onychium. At the end of the tarsus, or onychium if present, are two claws, equal in size; below and between them is frequently a third, smaller and more curved. The claws may be furnished with teeth, and are called dentated. Sometimes under the two larger claws, in place of a third, is a dense brush of hairs called a scopula. The abdomen is joined to the cephalothorax by a slender pedicel. At, or near, its extremity on the under side or venter are the spinning organs called spinnerets; these are of three pairs, the middle pair smaller and concealed by the other two. The spinnerets are probably always two-jointed, but in some spiders one pair is very prominently so. At the base of the lower pair of spinnerets is sometimes a transverse surface provided with spinning tubes; this is called the cribellum. Complementary to this in function is a row of stiff hairs or bristles on the posterior metatarsi called the calamistrum. Near the base of the spinnerets is a pair of stigmata, which are sometimes placed much more anteriorly, even nearer the basal than the distal end of the abdomen. When so situated there is formed a transverse ridge or fold on the venter. Near the base of the venter is a pair of transverse slits; these are the lung-slits. In some spiders there are two pairs. Between them on the median line is the opening of the genital organs; in the female called the epigynum. Its structure, together with the structure of the male palpal organ, is of utmost importance in the determination of species.

Because of certain peculiarities, I shall treat the cave forms separately in the key. The characters of the families as indicated in the system should be used in connection with the key.

KEY TO THE FAMILIES OF SPIDERS OF THE U. S.

1	Fang moving vertically, usually two pairs of lung slits	31
	Fang moving horizontally, but one pair of lung slits	2
2	Cave species	3
	Not cave species	5
3	Six eyes, in three groups of two each, body round	*Dysderidæ*
	Eyes not so arranged, body more elongate	4
4	Two claws to tarsi	*Clubionidæ*
	Three claws to tarsi	*Theridiidæ*
5	Eyes six	6
	Eyes eight	9
6	A pair of stigmata just caudad of the lung slits	*Dysderidæ*
	No stigmata close to lung slits	7
7	The six eyes in three groups of two each	*Scytodidæ*
	The six eyes in two groups of three each	8
8	Legs very long and slender	*(Spermophora) Pholcidæ*
	Legs short	*(Neophanes) Dictynidæ*
9	Cephalothorax produced in front of pars cephalica, which is very small, maxillæ closely surrounding the lip, mandibles small, cephalothorax roundish	10
	Not such spiders	12
10	S. E. touching	*Pholcidæ*
	S. E. separated, P. S. E. and P. M. E. touching	11
11	Apex of abdomen surrounded by a circle of bent hairs	*Urocteidæ*
	Abdomen without such hairs	*Filistatidæ*
12	Eyes equal or subequal, often dissimilar *, more or less in two rows variously curved, forming a group much wider than long	20
	Eyes unequal, similar, in three or four rows, forming a group almost as long or longer than wide	13
13	With a calamistrum and cribellum	*(Hyptiotes) Uloboridæ*
	Without calamistrum or cribellum	14
14	Largest eyes in anterior row	15
	Largest eyes not in anterior row	16
15	Eyes in three rows	*Attidæ*
	Eyes in four rows	*Lyssomanidæ*
16	Two claws to tarsi, only two eyes in anterior row	*Ctenidæ*
	Three claws to tarsi	17

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* Dissimilar = eyes of two colours, dark and light; similar = eyes of but one colour.

17	Two eyes in anterior row	18
	Four eyes in anterior row	19
18	A high clypeus	*Oxyopidæ*
	Almost no clypeus	*Podophthalmidæ*
19	Eyes of second row immensely larger than those of the third row	*Dinopidæ*
	Eyes of second row not much larger than those of third row	*Lycosidæ*
20	With calamistrum and cribellum, three claws to tarsi	21
	Without calamistrum and cribellum	22
21	S. E. not as far apart as M. E., clypeus high	*Dictynidæ*
	S. E. as far or farther apart than M. E., clypeus low	*Uloboridæ*
22	Tarsi with two claws	23
	Tarsi with three claws	27
23	Second pair of legs longer than the fourth, all eyes similar, cephalothorax somewhat roundish	24
	Second pair of legs not longer than the fourth, A. M. E. diurnal, rest nocturnal, cephalothorax more elongate	25
24	A. M. E. very close to clypeal margin, clypeus low	*Sparassidæ*
	A. M. E. some distance from margin, clypeus higher	*Thomisidæ*
25	Mandibles very large, trochanters long	*Prodidomidæ*
	Mandibles and trochanters normal	26
26	Maxillæ with a concavity or furrow	*Drassidæ*
	Maxillæ convex	*Clubionidæ*
27	But one pair of spinnerets	*Palpimanidæ*
	Three pairs of spinnerets	28
28	Clypeus wider than ocular area	29
	Clypeus narrower than ocular area	30
29	Lower spinnerets longer than upper, two-jointed	*Enyoidæ*
	All spinnerets equally short	*Theridiidæ*
30	Superior pair of spinnerets longer than the others, two-jointed, A. M. E. diurnal, S. E. separated, not far from M. E.	*Agalenidæ*
	All spinnerets short, S. E. often touching, often far from M. E.	*Epeiridæ*
31	Legs very long and slender	*Hypochilidæ*
	Legs stout and shorter	32
32	Two pairs of lung slits	33
	But one pair of lung slits	*Catadysidæ*
33	Palpi arising from the side of maxillæ	*Atypidæ*
	Palpi arising from the tip of the maxillæ	*Theraphosidæ*

A SYSTEM OF SPIDERS.

Division I.—*Gnaphosæ.*

This embraces but one section.

Section I.—This section contains the spiders which have the mandibles moving vertically. With the exception of one doubtful form they have four lung sacs. There is no epigynum in these forms, the male palpal organ is very simple, consisting of a bulb tapering on one side to a tube; the tarsus of the palpus is not at all modified. They are a tropical group and include the largest and most powerful spiders known. They have developed from primitive spiders like *Filistata*.

Family 1, *Atypidæ.*

This includes but one genus, *Atypus*, whose members are quite rare.

Family 2, *Theraphosidæ.*

These are the tarantulas. We have two sub-families.

1 Inner distal angle of maxillæ slightly prolonged; palpi somewhat lateral...*Eriodontinæ.*
Inner distal angle of maxillæ not prolonged; palpi terminal. ....*Theraphosinæ.*

The *Theraphosinæ* may be divided into two tribes.

Three claws to tarsi...*Trionchi*
Two claws to tarsi...*Dionchi*

The *Dionchi* have one genus *Eurypelma;* the true tarantulas. The *Trionchi* may be separated into two groups.

Median groove longitudinal.......................................*Mecicobothri*
Median groove transverse...*Æpicephali*

Family 3, *Hypochilidæ.*

This is represented by one peculiar genus *Hypochilus*. In the shape of the body and the length of the legs it has great resemblance to a *Pholcus*. It has a calamistrum and cribellum. The only species in the U. S. spins a web similar to some *Therididæ.*

Family 4, *Catadysidæ.*

Represented by one genus *Catadysas*, which has not been seen since described by Hentz. It stands on the dividing line between the typical members of this division and the more typical spiders, in having but two lung-sacs.

Division II.—*Micrognathæ.*

With but one section.

Section II.—This includes spiders of the most primitive and comprehensive form; "prophetic types" as the older naturalists would call them. They have a roundish cephalothorax which projects in front of the small pars cephalica. The maxillæ closely surround the lip. The mandibles are small. The legs are usually long and slender, and they make irregular webs.

Family 5, *Filistatidæ.*

These are the lowest spiders. The pars cephalica is no larger than the eye-tubercle of *Phalangida* with which it is homologous. The male palpal organ is the most simple, only a tube at the end of the tarsus. *Filistata* occurs in the southern parts of our country.

Family 6, *Urocteidæ.*

This family is represented by one species of *Thalamia* in the Southern States.

Family 7, *Scytodidæ.*

This distinct group is represented by two genera, somewhat rare in the Southern States.

Family 8, *Pholcidæ.*

Here the legs are long and slender, the tarsus in the typical forms being furnished with an eighth joint. The forms are principally southern. I include in this family *Pholcus*, *Spermophora* and *Spintharus*.

Division III.—*Veræ.*

Here we come to the typical and more common spiders. It embraces three sections.

Section III.—This is about the same as the *Tubitelariæ* of certain writers. The cephalothorax is usually low and elongate. The abdomen also is commonly elongate and low. The legs fitted for running. The eyes are equal in size and plainly in two rows.

Family 9, *Dysderidæ.*

These have but six eyes; just behind the lung-slits is a pair of stigmata. The forms are uncommon.

Family 10, *Prodidomidæ.*

We have but one genus and species in the Southern States.

Family 11, *Drassidæ.*

This embraces a number of common spiders. The body is low and flat, the legs short and stout, the spinnerets usually projecting behind. They spin no web but lead a wandering life in search of prey, mostly at night. There are two sub-families.

A dorsal groove present .... *Drassinæ.*
No dorsal groove present .... *Micarinæ.*

The latter group is represented by *Micaria* which is quite rare.

The *Drassinæ* may be divided into two tribes.

Hind row of eyes recurved .... *Gnaphosi.*
Hind row of eyes straight or procurved .... *Drassi.*

The former includes *Gnaphosa*, *Poecilochroa* and *Pythonissa.* The latter includes *Echemus*, *Drassus*, *Prosthesima* and *Teminius.*

Family 12, *Clubionidæ.*

Closely related to the preceding family, they are usually light coloured, while the *Drassidæ* are dark.

The legs are a little longer and more slender, the spinnerets less prominent, and the abdomen more round. It may be divided into three sub-families.

1 A transverse furrow on the venter .... *Anyphæninæ*
No transverse furrow on the venter 2

2 A stiff, horny shield either on dorsum or around the base of the pedicel .... *Corinninæ*
Abdomen wholly soft .... *Clubioninæ*

The latter sub-family may be divided into two tribes.

Two rows of very strong spines under tibiæ I. and II.... *Phrurolithi*
Tibiæ I. and II. not strongly armed .... *Clubioni*

Family 13, *Agalenidæ.*

Not a very extensive family; most numerous in the west. The pars cephalica here is very distinct, and occupies the whole width of the cephalothorax in front. One genus, *Cybaeus*, disagrees with the characters of the family, as the spinnerets are all short; the genus will, however, be readily recognized as belonging to the family because of its general resemblance to other more common forms. Two well marked sub-families can be recognized.

A transverse furrow on venter, lower spinnerets widely separated .... *Hahninæ*
No ventral furrow, spinnerets as usual........................ *Agaleninæ*

The latter may be divided into two tribes.

Upper spinnerets long, two-jointed........................ *Agaleni*
All spinnerets short........................ *Cybaeni*

Family 14, *Enyoidæ.*

The lower spinnerets here are long and two-jointed. Otherwise much like the preceding family. We have one genus, *Habronestes*, in the Southern States.

Family 15, *Palpimanidæ.*

Peculiar in having but one pair of spinnerets. One genus, *Lutica* from Utah.

Family 16, *Dictynidæ.*

This family is much like *Agalenidæ*, but have the accessory spinning organs. They are usually smaller. They spin small irregular webs, hanging from the under side.

Section IV.—This includes a large number of common spiders. They spin webs to catch prey. Most of the forms are very much alike in appearance. The abdomen short and rounded, the cephalothorax short with well developed pars cephalica, and the legs somewhat long, always with three claws. The spinnerets are short, the male and female organs well developed.

Family 17,, *Theridiidæ.*

This is the largest family of spiders, and many of its members are very small. They spin irregular webs, and hang inverted from the under side. The males frequently possess peculiar sexual modifications of the head. They can be arranged in three sub-families whose limits are not distinct. Their general characters are as follows :—

Theridinæ.

The abdomen is large and roundish, the cephalothorax short, the legs long and quite slender ; mandibles thinner than femur I.; male palpal organ without tarsal hook.

Erigoninæ.

These are smaller species, the abdomen not very much larger than the cephalothorax, and a little elongated. The legs are shorter than in the *Theridinæ*, and the male palpal organ has a tarsal hook; the epigynum not projecting, the legs without long spines, head of male often curiously modified.

Lingphinæ.

These have longer legs than the preceding, and they are more spiny; the epigynum often projects. They are more usually marked than the *Erigoninæ*, and are generally larger.

Family 18, *Epeiridæ.*

This includes the common orb-weaving spiders; a few other genera are included—*Pachygnatha*, *Glenognatha*, *Bellinda* and *Mimetus*. They are very similar to the *Theridinæ*, but have a low clypeus. Three sub-families may be recognized.

1 { Body with spine-like projections........................*Gasteracanthinæ*
  { Body without such projections, at most with two basal humps..... 2
2 { Male mandibles large, body elongate......................*Tetragnathinæ*
  { Mandibles small, body shorter.. ....*Epeirinæ*

These sub-families, like those of the *Theridiidæ*, also intergrade.

Family 19, *Uloboridæ.*

Related to the *Epeiridæ* by their habit of building orb-webs, but their structure quite distinct. We have but two genera, *Uloborus* and *Hyptiotes.*

Section V.—This includes the Laterigradæ of authors. The body is flattened, the first two pairs of legs long, the abdomen short and roundish.

Family 20, *Thomisidæ.*

These are frequently found upon flowers and fences waiting the approach of some insect. There are a great number of cases of protective resemblance in the group. They walk most easily sideways, and many throw off their legs very readily.

{ Two front pairs of legs much larger and longer than the others, no scopula...*Thomisinæ*
{ Two front pairs of legs not larger than the others, a scopula present. ....*Philodrominæ*

Family 21, *Sparassidæ.*

These resemble the *Philodrominæ* of the preceding family. They occur in the south and southwestern parts of the U. S.

Division IV.—*Oculatæ.*

Here the eyes are strongly unequal in size; the pars cephalica very large, the eyes in three or four rows. They are the most active and highly developed spiders. They spin no web but hunt their prey.

Section VI.—This includes the *Citigradæ* of most authors.

Family 22, *Ctenidæ.*

These have much affinity with the *Sparassidæ.* There is but one genus in the Southern States.

Family 23, *Lycosidæ.*

These are the "wolf-spiders" which run among leaves and grass and over rocks. Their legs are moderately long and quite stout, with many hairs and spines. The mandibles are large and strong.

Ocular area slightly broader than high	*Dolomedinæ*
Ocular area as high or higher than broad	*Lycosinæ*

Family 24, *Dinopidæ.*

One genus quite peculiar in the South.

Family 25, *Podophthalmidæ.*

One peculiar genus in the Southern States.

Family 26, *Oxyopidæ.*

Three genera, mostly southern and western forms. Somewhat intermediate between the *Lycosidæ* and the *Attidæ.*

Section VII.—The *Saltigradæ* of authors, the "jumping-spiders". Their body compact, the legs short and stout, the size medium. The *Hymenoptera* of spiders.

Family 27, *Attidæ.*

This contains nearly all the forms of the section. Three sub-families may be recognized.

1	Ant-like spiders, slender legs	*Synemosinae*
	Not ant-like, legs more stout	2
2	Eye region longer than thoracic region	*Ballinae*
	Eye region shorter than thoracic region	*Attinae*

The latter may be separated in two tribes.

Cephalothorax low, depressed	*Marptusi*
Cephalothorax high, raised	*Phidippi*

Family 28, *Lyssomanidæ.*

One genus in the Southern States.

CANADIAN HYMENOPTERA.—No. 1.

BY W. HAGUE HARRINGTON, OTTAWA.

Under this heading, I propose to give from time to time descriptions of new species in my collection, and such notes on other species as may seem of value to students of our fauna.

NOTOPYGUS AMERICANA, n. sp. — Female, length 10 mm.; head, antennæ, thorax, coxæ and first segment of abdomen, black; remainder of abdomen and legs red; antennæ as long as head and thorax, filiform, joints short and subequal; thorax elongate, shining; metathorax, rounded and obliquely truncate; wings, slightly infumated, with black nervures; abdomen shining, as long as thorax, triangularly clavate, truncate at apex, with the ovipositor curved upward; sheaths black.

Described from one ♀ captured on 16th June, 1891. This fine species is the first of the genus to be recorded from Canada, and may be readily recognized by the conspicuous, erect ovipositor.

PRIONOPODA CANADENSIS, n. sp.—Female, length 9 mm.; head above antennæ, thorax, coxæ and trochanters, posterior tibiæ and tarsi, base and apex of abdomen, black; face below antennæ, the cheeks, anterior and middle legs, posterior femora and base of tibiæ, abdominal segments two, three and base of four, and venter, red; head very large, wider than the thorax, cheeks much swollen; antennæ very long, brownish above, pale beneath; third joint globose, smaller than second, fourth nearly as long as five and six; thorax short and robust; metathorax rounded; scutellum rather prominent, rounded; wing without areolet; posterior legs long, femora slightly clavate, coxæ large, globose; claws strongly pectinate; abdomen fusiform, somewhat compressed at apex.

Described from one ♀ captured on 20th June, 1891. This is a very handsome species, owing to its coloration and highly polished appearance (no punctures are visible under a strong hand lens). It should perhaps form the type of a new genus, as it differs greatly in structure of thorax, etc., and in wing venation from *P. scutellata*, Ashm.

ISCHYROCNEMIS OTTAWAENSIS, n. sp.—Female, length 7 mm.; black with the legs, scutellum, mouth parts and orbits of eyes honey-yellow; head slightly swollen so that the face is feebly carinate; antennæ long, pubescent, with longer erect hairs at apices of joints; thorax shining;

metathorax rounded, faintly areolated ; scutellum elevated, smooth, red on the disc ; legs not very stout, posterior femora but slightly swollen ; wings large, hyaline, stigma pale-yellow, areolet rhomboidal ; abdomen polished ; apex of segments one and two narrowly margined with red ; ovipositor exserted, red, sheaths black.

Described from one ♀ captured some years ago, and differs abundantly from *I. carolina*, Ashm.

MESOLEPTUS NIGRICORNIS, Prov. (Add. Faun. Hym. 99), must be removed to the genus *Ctenopelma.* The type which is in my collection has the claws so distinctly pectinate that I do not see how this character was overlooked. I have a second ♀ taken shortly after the first one was described.

PIMPLA ELLOPIÆ, n. sp.—Female, length 10 mm.; black with red abdomen ; face coarsely punctured, with feeble smooth ridge below antennæ, which are long and slender ; thorax shining, punctures shallow ; legs black, anterior femora and tibiæ with pale line, anterior and middle tarsi rufous, base of posterior tibiæ and the tarsi piceous ; abdomen red shining ; punctures fine ; ovipositor half as long as abdomen.

Male, length 8 mm.; posterior femora red, and abdomen slightly darker and not so polished as in the ♀.

Described from one ♀ and one ♂ received from Mr. Fletcher, who bred them from pupæ of *Ellopia somniaria* from Victoria, B. C. (See report of Experimental Farms, 1890, page 177.)

OUR WINTER BEETLES.

BY H. F. WICKHAM, IOWA CITY, IOWA.

Though the winters of Iowa are quite severe, there are, nevertheless, always a few days when the weather is moderate enough to admit of the entomologist getting out for a few hours work at his favourite pursuit. When the sun comes out and the snow disappears in sheltered spots, a little investigation will yield much that is of interest, and throw considerable light on the habits of many of our insects.

Among the Carabidæ to be found in February may be mentioned

Tachys lævus, *Pterostichus patruelis*, *Platynus lutulentus* and *Stenolophus conjunctus*; all except the first quite common under stones and chips—the *Pterostichus* and *Platynus* preferring moist places, while the others like to rest under objects which lie on turf. Some water beetles (*Hydroporus modestus* and *Laccophilus fasciatus*) I have taken in water beneath the ice. What explanation can be advanced to account for their remaining active in such a cold medium when their terrestrial relatives are torpid?

Scydmaenus fossiger and *basalis* may be taken under stones and chips which are resting lightly on turf, in company with *Ctenistes piceus*, *Decarthron abnorme*, and one or two other Pselaphidæ. Staphylinidæ are the most numerous of all, both in species and individuals, and all of the following species may be taken at any time during the winter:—*Pæderus* sp., *Sunius binotatus*, *S. longiusculus*, *Falagria venustula*, *Tachyporus brunneus*, *Stilicus angularis*, *Diochus schaumii*, *Olophrum rotundicolle* and two or three species of *Stenus*, all under stones or chips, some being found also in moss. *Scaphidium quadriguttatum* I also find in moss during cold weather, and in fact have not met with it at any other time. Our Iowa specimens are the variety called *piceum*.

Of Phalacridæ I always find numerous *Olibrus nitidus* and *O. consimilis*, of Corylophidæ *Sericoderus flavidus*, and of Erotylidæ *Languria mozardi*, all under loose stones and chips, in company with *Corticaria pumila*. The remaining families appear to be represented more sparingly if we consider the great number of species that some of them contain.

Cerambycidæ have been rarely reported as winter insects, so I was surprised one New Year's Day, six years ago, to come across one of them alive, resting under a stone. Judging from memory alone (for the specimen has gone out of my possession) it was probably *Leptostylus aculiferus*. Of Chrysomelidæ I take occasionally *Chrysomela suturalis*, and also have *Mantura floridana* down on my list for the year 1886. The only Scarabæid I take is *Aphodius inquinatus*, not a *bona fide* native of our country, though evidently come to stay. The Tenebrionidæ, so characteristic of hot and dry climates are represented only by a *Paratenetus* which, however, is often seen in considerable numbers. A species of *Apion* and *Sphenophorus parvulus*, which are of occasional occurrence, finish the list.

Many species no doubt pass the winter in the perfect state, but being either buried deep in the ground or imbedded in the substance of trees escape our notice, and as few entomologists are sufficiently enthusiastic to make large and deep excavations with so little prospect of return I fear our knowledge of such as are included in the former category will long remain incomplete. My own exertions at the wood pile have yielded only bark beetles (and larvæ) during the winter, though some evidently spend this season more or less deeply imbedded in sound or decaying wood. (See note by Mr. Blanchard, CAN. ENT. VII., p. 97.)

Any comparison of such an incomplete list of our winter insects with the forms known from the inhospitable climate of the far north would be vain ; but I would remark the preponderance of Staphylinidæ, as suggestive, when taken in conjunction with the nature of the species of the other families here noted, of at least an apparent similarity.

CHIONOBAS UHLERI.

BY T. D. A. CŎCKERELL, INSTITUTE OF JAMAICA.

Mr. W. H. Edwards, in his most interesting account of *Chionobas uhleri*, (Butt. N. A., Pl. XII., Vol. 3) remarks that he can find no evidence that it is found in the south of Colorado. It may, therefore, be as well to record that I found it near Swift Creek, in Custer County ; and Mr. H. W. Nash informed me that it occurred at Rosita, in the same county. These localities are just north of 38° N. Lat.

With regard to the variation in the ocelli of this and other Satyridæ, it becomes rather difficult to give statistics without the use of some regular formula. Mr. Edwards gives the *number* of ocelli observed in different individuals, but we are left in doubt as to *which* particular ones were present, and which absent.

A convenient method of indicating the exact nature of these variations is to have a series of figures corresponding to the interspaces, numbering from above downwards. If a butterfly had fully developed pupilled ocelli in all the interspaces, the formula would read P. (for primary) 1234567, S. (for secondary) 1234567. When an ocellus was wanting, o might be substituted, and for an ocellus which had no pupil, we might put a small figure below the line, thus $_2$. Two or more ocelli joined would be bracketed together, so (12), and a continuous band would consequently be represented by all bracketed together, thus (1234567). Up. s. and und. s. might be used to indicate the upper and under sides respectively; and in the case of asymmetrical specimens (which are rather frequent in some species) the left and right sides would require sparate formulæ.

To give examples, the figures of *C. uhleri* on Mr. Edwards's plate would have the following formulæ:—

Fig. 1, up. s. P. 00_30000 S. 0000000.
Fig. 2, und. s. P. 00_30000 S. 0000000.
Fig. 3, up. s. P. $0_234_{56}0$ S. 0234560.
Fig. 4, und. s. P. 0034560 S. 0234560.
Fig. 5, up. s. P. $00_30_{56}0$ S. $00_30_{56}0$.
Fig. 6, up. s. P. 00340_60 S. $0_{23}00_60$.

This looks complicated, but the method is really simple and easy to understand, and as short as any which exactly defines the character of the variation.

HOW TO TAKE THE OIL OR GREASE OUT OF SPECIMENS OF NATURAL HISTORY.

BY PH. FISHER.

When a specimen has become oily (Lepidoptera, Coleoptera, Orthoptera, etc.,) use a bottle with a neck wide enough to let the specimen slip through easily, pin and all. Put in this bottle enough common naphtha to fully cover the insect, and introduce it into the fluid. Leave it in the bottle from 10–12 hours. Then take it out, and lay it on some blotting paper, where it will soon dry. If not yet clean, introduce in fresh naphtha once more. This treatment will not injure the insects in the least; they will come out brand new. Before publishing this, I have tried it on the most delicate Lepidoptera and Coleoptera, with the best results. If the body only is oily, break it off gently, and treat in same way.

CORRESPONDENCE.

PROF. J. B. SMITH'S LIST OF LEPIDOPTERA.

Dear Sir: There be criticisms and criticisms; those intended as friendly and those intended as destructive in character, and sometimes one is as unwittingly unjust as the other may be intentionally so. Mr. Dyar's notice of the List of Lepidoptera, in the February number of the CAN. ENT., calls forth this moralizing expression. Mr. Dyar is evidently a friendly critic, and I feel obliged for his kind words; but some of the "inaccuracies and omissions" are misleading. The List went to the printer in June, the Bombycids were printed in August, and Mr. Hudson's descriptions of *Dasychira* and *Cerura* did not appear until September or October.

Sarrothripa reveyana, S. V., is not an omission. Speyer showed years ago that the American forms were distinct from the European, and he named the Americans *S. lintneriana*. I might have cited *reveyana* in error as a synonym of *lintneriana;* but can hardly be charged with an omission.

Gastropacha alescensis, Pack., is unknown to me, except in the casual reference by Stretch. It is not given in Dr. Packard's monograph of the *Bombycid* , nor does it appear in Mr. Grote's lists. I have not examined all of Dr. Packard's writings; but in the list of "The Entomological Writings of Dr. Alpheus Spring Packard," by Samuel Henshaw, Bulletin 16 of the Division of Entomology, U. S. Department of Agriculture, there is no mention of any *G. alescensis* in the "Systematic Index of the New Names Proposed." It is quite fair to assume that no such species was ever described, until Mr. Dyar points out the place of original description.

The compiler of a list cannot reasonably be held to a special knowledge of all groups, and if he gives the condition of affairs as it stands in literature at the time, he has made no error. As literature stood when I wrote, *Arctia sciurus* had been referred to *Euchætes collaris*, and I could not know that Mr. Edwards had reached a different conclusion—even now Mr. Dyar does not state positively that *sciurus* is *not* a variety of *collaris*. Unpublished synonymy does not form a good basis for a charge of inaccuracy. As to *Edema albicosta*, Hbn., I find on my cards after the reference to the original description :—" 1825, Treit. Schmett. Eur. V., 2, 167=*albifrons* with an erroneous locality." Packard omits the name altogether, while Mr. Grote lists it as distinct. As to *Cerura*, Mr. Dyar is entirely correct. I copied the species as given in his table ; but unfortunately in preparing the MSS. for the printer I failed to number *scitiscripta*. The name was therefore put in italics and I failed to notice the error in reading proof. *Hemileuca neumoegeni* and *Eutheca mora* are genuine cases of omission.

I have replied to Mr. Dyar's criticisms because they were kindly and therefore very much more apt to convey weight; also to show that it is not safe to assume that criticisms are always well founded even when not replied to. J. B. Smith.

MANUAL OF THE MICROLEPIDOPTERA OF N. AMERICA.

Prof. C. H. Fernald, of Amherst, Mass., is at work on a manual of the Microlepidoptera of North America, a work for which his studies of the last twenty years have admirably fitted him. He has made two trips to Europe for the purpose of studying the types of our Micros in the European museums, and has studied all the prominent collections in this country. His magnificent library and collections of these moths afford him the best possible facilities for carrying out this work, which will prove a task which anyone else could hardly undertake. The immensity of this work is appalling when we consider the extent of territory embraced, the great number of species, and particularly the fact that we have so few good collectors of Micros in this country.

Prof. Fernald is particularly desirous that collectors should give especial attention to the collection of Microlepitoprera for the next few years.

OBITUARY.

It is with the deepest sorrow that we have to announce the death, on 15th March, of Mr. F. B. Caulfield, of Montreal, who has been for many years an active member of our Society. His loss will be keenly felt by the members of the Montreal branch, of which he has always been one of the chief supports. We tender our sincerest sympathy to his sorrowing family.

Mailed April 2nd.

The Canadian Entomologist.

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MISCELLANEOUS NOTES ON BUTTERFLIES, LARVÆ, ETC.

BY W. H. EDWARDS, COALBURGH, WEST VA.

(Continued from page 56.)

2. *Argynnis Oweni*, n. sp.

MALE—Expands 2.25 inches.

Upper dull side red-fulvous, not much obscured by brown at base; the markings rather heavy, the two marginal lines on both wings more or less confluent. Under side of primaries either yellow-buff from base to the row of rounded spots, the nervules being red-brown, or the interspaces are very lightly washed with this colour over the buff ground: the subapical patch dark brown with a small imperfectly silvered spot: the five submarginal spots also are of same character; sometimes the silver is wholly wanting.

Secondaries dark brown and gray-buff, the brown prevailing on the disk, so that the second row of spots stand on a clear brown ground; but above this to base the buff prevails, especially along the third row of spots, and below the cell; but occasionally the mottled surface extends quite to the belt; the belt red-buff, and very narrow, being much encroached on by the dark brown (almost black-brown) projections from the discal area, and by the wide brown edging of the submarginal spots; these spots are small, semi-oval; those of the second row small, sub-oval; the outer row is generally well silvered, but all the others are imperfectly so in most cases, but occasionally one is well silvered throughout, or the outer two rows may be well and the remainder imperfectly silvered.

FEMALE.—Expands 2.4 inches.

The fulvous mottled with yellowish on both wings outside the mesial band, on secondaries the yellow corresponding with the second row of silver spots; also in the cell of primaries the hue is yellow fulvous; the black markings all very heavy; the marginal lines nearly confluent throughout. Secondaries as in the male, except that the basal colour is deeper, reddish ; mottled as in the male ; in all the specimens under view the spots are well silvered.

From 87 males and 6 females taken by Professor Edward T. Owen on Mt. Shasta, elevation 7,500 feet. These specimens have all been viewed by me. The upper side of the female is very close to *A. Behrensii* in colour and in weight of the black markings. In the male of that species the markings are much lighter than in the present one. On the under side both sexes of *Behrensii* have the ground of hindwings solid ferruginous, not mottled as in *Oweni.*

2. *Argynnis Cornelia*, n. sp.

MALE.—Expands 2.3 inches.

Upper side dark brown from base to the common mesial band, excluding the upper outer part of the cell of primaries, the space beyond the band light red-fulvous ; the black markings rather delicate ; the margins edged by two parallel fine lines. Under side of primaries cinnamon-brown (or sometimes a little reddish), from base to hind margin on inner half of the wing ; the interspaces towards apex yellowish ; the subapical patch red-brown, enclosing a small silver spot ; the hind margin red-brown, the five silver spots small.

Secondaries almost solid red-brown from base to the clear yellow-buff belt, broken only by a few short streaks of buff on the disk ; the spots all small, well silvered ; those of the marginal row subtriangular, edged heavily on the basal side by red-brown ; those of the second row mostly narrow sub-oval, very lightly edged at top with black, as are the spots of the third row ; two small spots next base, and one in the cell.

FEMALE.—Expands 2.5 inches.

Less bright red, the markings heavier ; the submarginal spots on primaries pale yellowish fulvous ; the marginal lines on same wings confluent on upper half. Under side of primaries red over inner half ; secondaries as in the male, the ground less red, more brown : all the spots well silvered.

This species flies with *Electa* and *Hesperis*, at Ouray and Manitou, Colorado, and in the adjacent districts, where it has been taken abundantly by Prof. Owen. Mr. Bruce has taken it also at Crested Butte in the Ouray region. It is of same size as *Electa*, and resembles *Cybele*, especially the form *Carpenterii*, much as *Electa* resembles *Atlantis*, the basal area contrasting strongly in hue with the area beyond, as in *Cybele.*

Described from nearly forty examples sent me by Prof. Owen and Mr. Bruce. At the request of the Professor I name this species in memory of his deceased daughter, Miss Cornelia, formerly the companion of his entomological excursions.

3. *Limenitis Weidemeyerii*, Edw.

Mr. Bruce sent me fifteen eggs of this species from Hall Valley, Colorado, elevation 10,000 feet. and I received them 24th August, 1891. He wrote :—" I saw the female evidently trying to lay her eggs ; caught and tied her on a small cotton wood close to my window. It rained for three days, and during this time she remained motionless on the under side of a leaf. By noon on the fourth day the weather had become fine and warm. On the fifth day she laid the eggs. I have before confined several females of the species without effect, and was not a little pleased at seeing the beautiful eggs." (I may say here that *L. Ursula* is almost the only species of butterfly which has persistently refused to lay eggs for me in confinement. *L. Disippus* will lay readily enough, but I never have seen more than two or three eggs of *Ursula.)* The eggs of *Weidemeyerii* are of same character as those of the allied species at the east, and the young larva at birth looks just like a young *Disippus* larva—the colour light brown. It makes a perch in exactly the same way. After the first moult, the colour was dark gray-black, the patch on middle segments sordid white, and the stripe at base along the last segments same ; so was the dorsum on 3 and 4. The description of *Disippus* at this stage will cover the present species, except that the latter is more gray. After second moult the colour was mostly black, the patch and stripe yellow-white. The third moult I missed. After the fourth, length .8 inch, the shape and the processes were closely as in *Disippus;* the dark parts red-brown, a little mottled black ; the patch yellow-buff ; the basal stripe pure white, and running from 2 to 13 ; the dorsum and sides of 3 and 4 yellow-buff ; the processes as in *Disippus* ; length of the process on 3 .11 inch ; head as in *Disippus*, red-brown, rough with tuberculations. Three days after fourth moult the dark parts turned to olive-green (just as in all the allied species). At maturity, measured 1.2 inch, lying straight on a stem. After four days more suspended, and the next day pupated. The pupa measured .9 inch in length, shape of *Disippus* and *Ursula*, the dorsal process possibly a little more circular than in *Disippus;* colour of the head case, and of ventral side. and of the wing cases, blackish-brown, as is also the process; abdomen light-buff with a pink tint, mottled with olive-green, less so on the dorsal side; the end segments dark-brown; dorsal side of head-case and the mesonotum pale brown, the head-case obscurely silvered. I got but one pupa, and that died before imago, and of this Mrs. Peart made a coloured drawing. Only one larva went through all the stages, the others, after second moult, made cases, just as the allied species do, and I have them here, out in the weather, under a net to protect them from birds. The larvæ hatched 28th August; passed first moult 1st September, second moult 4th; one passes fourth moult 13th Sept., pupates 18th.*

4. *Argynnis Epithore*, Boisd.

This small species belongs to Group II. of my Catalogue, 1884, and its nearest ally on this continent is *A. Bellona*, Fabr. It flies in the Pacific States and to and through the Rockies. On 7th July, 1890, I received several eggs from Mr. Kœbele at Spokane, Washn., and they were hatching on arrival. The larvæ passed first moult on 11th July; second, 15th; third on 19th, and within two days thereafter all except one became lethargic after third moult, and before 27th July. The one passed its fourth 7th August, and was sent to Professor Riley for a drawing. It pupated while in his care, but I have not the date. The imago came out at Washington. Excellent coloured drawings were made of the adult larva and pupa. I attempted to carry the hibernating larvæ through the winter at Coalburgh, but they one by one died, the last about middle of February. The food plant was violet. The larva at birth resembled closely those of *Bellona* and *Freya* (which last I had feeding at same time), the segments 5, 7, 9, 11 being brown, as in those species, while the rest of the body was pale green. After first moult, length .14 inch; colour greenish-brown over upper part, greenish beneath; the spines short, stout, tapering, black; those on 2 no longer than in following segments.

At second moult, .24 inch; colour of dorsum black, with a pair of mid-dorsal gray lines; the sides mottled dull white and green; along base a narrow sordid white stripe from end to end; all the spines black, but in the dorsal rows, at bases of 2, 6, 8, 10, on outside, tubercle is pale, obscurely whitish.

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* I am able to say, on revising these proofs, that I got two of the larvæ through he winter. One has passed two moults since waking up, the other still sleeps.

After third moult: length .3 inch; colour gray, the sides speckled white; a blackish mid-dorsal stripe; the outer side of the tubercles of the mid-lateral row now white, and this colour is diffused so as to give the appearance of a macular stripe the whole length of body.

After fourth moult: length .5 inch; general colour gray; the dorsum and lower part of side dark; the area between these dark portions streaked crosswise with black; the basal stripe red-brown; the spines mostly russet from tip to base, but those on 2, 3, and the lower ones on 13, are all black; those on dorsum of 4 and 13 tipped black; all spines short, slender, tapering, with short black hairs; head obovoid, shining black, with long black hairs. I can only describe the pupa from the drawing. Shape of *Bellona;* the ventral side and the wing cases pale brown, the latter, along the margins shading into whitish, and at the margin becoming pure white; head-case on the dorsal side, and the mesonotum, pale brown mottled with whitish, in the excavation quite dark brown, especially next the wings; abdomen whitish, finely mottled with pale brown, with a dark brown patch on either side the ventral line on 9, 10; 11.

This larva, in the later stages, is quite different in coloration from *Bellona*, as may be seen by comparing this description with Mr. Scudder's, of *Bellona;* and the pupa differs still more.

5. *Anthocharis Genutia* and *A. Ausonides.*

On page 52 of this volume, I said that I had one pupa of *Genutia* of 1890 living. I had, in fact, three pupæ of that age, but supposed two were dead. But March 9th 1 ♂, and on 13th 2 ♀s came out, beautifully marked, all of them, the orange of the male vivid, and all with unusually large, black edging to forewings, and black marks at tips of the nervules of the hindwing.

At same time a female *Ausonides* has come out of a pupa that I have had since May, 1890, a large, well-marked example, the hindwing very strongly buff colour. I am told that some collectors think that A. *Hyantis* is spring form of *Ausonides.* If so, it is a mistake. There is but one annual brood of *Ausonides.* In different years I have had four examples come from bred pupæ; all in the month of March; all typical *Ausonides.*

6. *Lycæna Lygdamas*, Doubleday.

On May 25, 1891, I received from Mr. A. D. Hopkins, the Entomologist of the Agricultural Station of West Virginia, four larvæ of this species, found on *Vicia Carolinensis.* Mr. Hopkins wrote:—"The larvæ, when young, feed on the tender leaves and the flower buds; as they grow older they feed on the leaves and stems, eating the stems square off." The adult larva is very like that of *Pseudargiolus* in shape and appearance; length at rest .34 inch; breadth .05 inch; height .05 inch; long oval, the ends equally rounded; the dorsum high, a little flattened at top and sloping either way from about the middle; the last segment flattened; segment 2 is bent forward as in *Pseudargiolus*, and entirely conceals the head when at rest; it is depressed in the middle and thickened and cushion-like about the outer edge; colour pale green, the sides of the ridges marked by short, whitish, oblique bars, each bar crossing two segments; along the base a whitish stripe; on mid-dorsum of 11 is a cross slit, but I saw no fluid issue from it; on 12 the two cylindrical tubes and their tentacles were persistently thrust out and expanded. I got none of these larvæ to pupæ owing to a failure of food.

7. *Neophasia Menapia*, Felder.

Mr. Wright, in August, 1891, sent me eggs of this species obtained by him in vicinity of Mt. Shasta. They were laid 28th August, and I supposed would hatch immediately after arrival. But they have lived through the winter, and now, 15th March, look as fresh as when received. I was unaware that any species of Pierid hibernated in the egg stage. On 24th March, the day being warm, I brought the eggs into the house. On 4th April each egg had changed to white, and the black head of the young larva was visible through the shell. I thought they would soon hatch, but the larvæ died in the eggs. There must be two broods of the imago, and probably the eggs of the first one hatch a few days after laying.

8. *Colias Philodice*, albino male.

Since the issue of the March No. of C. Ent, I have received a letter from Mr. George A. Ehrman, of Pittsburgh, Pa., calling my attention to his report of the capture of an albino male of this species in Ent. News., Vol. 1, pp. 93 and 130. Since two males have been taken, it is to be inferred that others must exist in the proper season. Taking it for granted that all the white examples were female, I never searched for males, and so it has been probably with other collectors.

9. *Colias Christina.*

The first examples known of this species were described by me in 1863, and came from Great Slave Lake—3 ♂, 1 ♀—the males deep orange, the female yellow.

In 1872, I described Colias *Astræa* from a male taken by the Hayden Expedition in Montana. The upper surface was of a delicate buff. In 1883, Mr. Wm. M. Courtis, M. E., at Judith Mtn., Montana, took four males of the typical form ; and, in 1890. Mr. W. G. Wright, at same place, took both *Astræa* and orange *Christina* in both sexes.

In CAN. ENT., XV., p. 221, 1883, Captain Gamble Geddes gave a list of butterflies taken by him, and among these was *Astræa*, and also *Christina*, both from Red Deer River. I saw these examples, and they embraced not only typical individuals but others of varying shades of colour, connecting the two supposed species ; and with these lemon-yellow examples that seemed to belong to the same species with the others.

Within the last two years, Mr. Burrison and Prof. Owen have collected at Banff, and found all these forms—the orange, the buff and the yellow, with intermediate grades in great variety. Mr. Bean, at Laggan, has not only taken numbers of the same forms, but has carefully bred from the egg, and established the unity of the species *Christina* with *Astræa*, and the yellow form ; and in due time we may look for a full account of his observations. From a small lot of larvæ of *Christina* just out of hibernation, sent by Mr. Bean, and received 28th May, 1891, I got four pupæ. On 19th June, emerged a green-yellow male ; on 21st, another male, same form ; on 22nd a green-yellow female ; on 24th a yellow female with orange on the disks of the forewings. At the fourth (and last) moult the larva was .8 inch long ; colour dark yellow green ; along base a white stripe, within which, a few hours after the moult, a yellow stain began to show itself ; no subdorsal white stripe ; the under side light yellow-green ; whole upper surface thickly covered with fine tubercles and short hairs of light colour ; head yellow-green. At maturity the length was 1.4 inch ; the yellow had become red in the band, but it was not in a continuous line as in many species of Colias, there being only a short red dash behind each spiracle.

The pupa was similar in shape and appearance to that of *Philodice.* Length, .78 to .8 inch ; breadth, both across mesonotum and abdomen, .2 inch ; the greatest depth, .24 inch ; colour yellow-green, the ventral side of abdomen less green, more yellow ; a broad yellow stripe from 13 to wing cases on mid-side, and continued, but in diminished breadth along the dorsal edge of wing to end of the beak ; on the side of the abdomen below the yellow stripe a narrow stripe of red-brown crosses three segments from the wing case. Duration of the pupa stage about seven days.

TWO DISTINGUISHED SETTLERS.

BY W. HAGUE HARRINGTON, OTTAWA.

In the March number of Entomological News Dr. Horn records the capture at St. John, N.B., of *Carabus nemoralis*, Mull., by Mr. C. B. Riker, in April or May, 1891. I can confirm the occurrence of this species in the locality mentioned and can add from it a second species to our lists. On the 6th Sept., 1891, having the forenoon to spend in St. John I made a visit to the celebrated falls which pour up or down the river, according to the state of the tides, for which the Bay of Fundy is noted. I spent about half an hour searching for Coleoptera, and among the Carabidæ found under drift wood were two species of Carabus. As I had never captured specimens of this genus before, I was much pleased to find them, especially as they were different from any American species in my collection. For some time I could not identify them, but they proved to be *C. nemoralis*, Mull., and *C. granulatus*, Dej. Of the former I obtained five individuals (4 ♂, 1 ♀), and of the latter three (2 ♂, 1 ♀), besides a specimen which had the elytra so deformed that I let it remain, to be perhaps the progenitor of a new variety. As *C. cancellatus* had been recorded (although it has not yet been placed in the list) by Dr. Horn in Trans. Am. Ent. Soc., Vol. X., 270, 1883, as found at Wilmington, N.C., I thought for a time that my three specimens might belong to that species. I have now, however, after carefully examining Dejean's description and figures, and also by comparison with European specimens received as *C. granulatus*, satisfied myself that this is the species taken. The capture of this species recalls a specimen, dead and somewhat mutilated, which I picked up in Truro, N.S., some years ago, and which I then supposed to be a variety of *mæander*. The specimen was not kept as it was too much injured to be available for my cabinet, but from my recollection of it I think it must have been *granulatus*. Unfortunately there are few collectors in our Maritime Provinces, so that our knowledge of the occurrence and distribution of species is very small.

NEW NORTH AMERICAN HOMOPTERA—IV.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

Gnathodus impictus, n. sp.

Green, or yellowish green in the dried specimen ; scutellum and all beneath quite strongly tinged with yellow. Corium whitish hyaline, nervures green and strong, especially in the male. Wings white, iridescent, nervures pale. Eyes blackish. Antennæ and legs soiled yellow tinged with green, especially on the posterior tibiæ. Otherwise immaculate.

Genital characters. Male : Valve short, hind edge but feebly arcuated. Plates broad and short, outer edge rounded, with a few short, stout, white spines ; tips abrupt, narrow whitish, about one-half as long as the disc of the plates, placed nearly their own width from the sutural edge and approximated at apex. Pygofers moderately surpassing the plates, their leaf-like apices commencing at the extreme tip of the plates, where they are quite widely separated, and approaching posteriorly. Female : Last ventral segment long, slightly narrowed posteriorly and truncated at apex. Pygofers narrow, scarcely swollen at the middle, equalling in length the stout oviduct, disc armed with stout spines nearly to the base. Length 3½ mm.

New Jersey. Described from a single pair received from Prof. J. B. Smith, and labelled " New Brunswick, July 20."

Gnathodus abdominalis, n. sp.

Smaller than the preceding. Green, disc of the tergum brown, venter brownish green. Pronotum with three nearly obsolete longitudinal fulvous bands, continued over the basal field of the scutellum. where the lateral ones appear as fulvous-brown spots within the basal angles. Elytra whitish tinged with smoky on their apex, nervures concolorous but distinct. Wings slightly enfumed, nervures brown. Tibial spines pale ; claws brown. In faded examples the colour becomes whitish or yellowish green with the fulvous bands obsolete, or nearly so.

Genital characters. Male : Valve large, as long as the two apical ventral segments taken together ; apex angled, subacute. Plates but little surpassing the valve, narrow and pointed, fringed with stout spines. Pygofers long, their expanded tips slightly separated at base but approximated beyond. Length, 3 mm.

New Jersey. Described from two male examples received from Prof. Smith, and taken at New Brunswick, July 20th, and Jamesburgh, July

15th. This species differs from the preceding by its smaller size, the discoloured abdomen and the very distinct form of the male genitalia.

Athysanus comma, n. sp.

Form of *A. obsoletus*, Kirsch. Pale yellowish lineate with black and fulvous, anterior edge of the head with four black spots. Length 5 mm.

Female : Vertex flat, very slightly impressed within the obtuse anterior edge ; apex less acute than in *obsoletus* or *plutonius*. A spot below each antenna, four on the anterior edge of the head, and a smaller one on the hind edge either side of the median line, black. Pronotum short, obscurely wrinkled behind the anterior submargin, posterior edge straight, anterior feebly arcuated ; disc with four equidistant longitudinal strong brown vittæ, which become black where they touch the margins, the two central continued across the scutellum. All the femora and the posterior tibiæ lineate with brown above. Limb of the connexivum, and a slender line at its base, a spot on the apex of the last ventral segment, the sides of the oviduct, a large comma-shaped spot each side on the dorsal aspect of the pygofers, and an abreviated line on the apex of the tergum each side of the middle, black. Elytra pale ; within the costal margin is a broad fulvous band which is continued around the apex and connects with a similar band within the sutural margin ; claval suture marked by a slender black line, and exterior to this on the apical half of the corium is a similar and nearly parallel line.

Genital characters : Last ventral segment long, toward the sides thin and compressed around the base of the pygofers, hind edge with a broad, shallow concavity. Pygofers short and stout, their obtuse apex equalling the oviduct.

Iowa. One example received from Mr. C. P. Gillette.

Athysanus bicolor, n. sp.

Form of *A. Curtisii* but larger. Green, banded and lineated with black. Length, 3½ mm.

Head as in *Curtisii*, well produced before and tumid ; front swollen ; clypeus quadrangular, its broad apex exceeding the tips of the cheeks and a little concave ; outer angle of the cheeks rounded. Face black ; a broad transverse band below the eyes and sometimes the apex of the clypeus, greenish yellow ; vertex pale greenish, two large contiguous spots anterior to the middle or the entire apex, black. Pronotum yellowish green, black anteriorly between the eyes. Scutellum pale, with a broad black band covering its basal field and the base of the elytra. Elytra yellowish green, nervures concolorous; apical areoles, a large costal cloud beyond the middle sometimes extended along the centre of the antiapical areoles, a line adjoining the claval suture, and the commissural nervure, blackish fuscous. Wings white, nervures slender, brown. Legs and all beneath black; rostrum, tips of the anterior and intermediate coxæ, knees, tarsi, spines of the posterior tibiæ and the narrow edge of the ventral segments, pale; tergum black with a row of marginal pale spots; last ventral segment yellow, its sides and a heavy, double median line, not reaching its apex, black.

Genital characters. Female: Last ventral segment about the length of the preceding; hind edge feebly angularly concave and impressed toward the middle. Pygofers a little swollen at their middle; black with a broad yellow dorsal line. Oviduct far surpassing the pygofers, rufous.

Described from two female examples, one from Mississippi, kindly given me by Mr. Howard Evarts Weed, and a smaller specimen taken near Emporia, Kansas, by my brother Mr. M. C. Van Duzee.

In the pattern of its markings this species recalls the dark coloured specimens of *Deltocephalus debilis*, Uhler, but may at once be distinguished by the banded head and pronotum and the more obtuse anterior edge of the vertex.

Athysanus obtusus, n. sp.

Form of the preceding. Head well produced, tumid, as wide as the pronotum, apex obtuse, vertex pentagonal; soiled yellow or fulvous, with two large square black spots anterior to the middle encircled by paler. Front with a few short arcs and a large squarish basal spot black; above this on the edge of the vertex is a concentric black band, interrupted in the middle by a square pale spot at the tip of the head; a large spot below the antennæ and sometimes the ocelli black; outer margins and apex of the face dusky or black. Eyes dark brown, edged with pale behind. Pronotum well arcuated before; surface strongly transversely wrinkled, omitting the posterior and broad anterior margins, the latter paler with about eight black marks more or less coalescent. Scutellum pale, an angular black spot within the basal angles and a few brown lines on the middle. Beneath deep blue-black with one or two spots on the pleural pieces and sometimes the narrow edge of the ventral segments pale. Tergum blue-black, spotted on the margin with yellow or rufous. Legs pale testaceous, lineate below with black. Elytra deep fulvous-brown or fuscous, nervures distinct, pale, the commissural and those delineating the apical areoles heavy and brown. Wings whitish, highly iridescent.

Genital characters. Male: Valve small, black, edged with pale. Plates broad, but little longer than the valve, cut squarely off on their apex, with a few pale submarginal spines; yellowish, clouded with black beyond the valve. Pygofers nearly twice the length of the plates, blackish, fulvous at apex, with a broad pale yellow median band, their inner apical angles rounded off so as to expose the pale anal tube. Female: Last ventral segment short, hind edge feebly concave; pygofers broad, their pale acute tips much exceeded by the obscurely rufous oviduct.

Length, 3-3½ mm.

Mississippi. Described from one male and three female examples received from Mr. Howard E. Weed.

Deltocephalus flavocostatus, n sp.

Small; fuscous-brown; antennæ, legs, costal margin of the elytra, and a few small spots on the vertex yellow. Elytral nervures pale. Length, 3 mm.

Male: Head shorter, more conical, with the anterior edge more rounded and the vertex more convex than in the most of our species. Vertex marked with about ten yellow points, the apical four form a rhomboidal figure, two are on the ocelli, another pair are placed against the inner margin of the eyes, and on the middle of the basal margin are two elongated marks, in one example nearly obsolete. Face black, closely punctured; clypeus quadrangular, sutures straight; loræ well rounded outwardly, cheeks wide, forming a broad margin beyond the loræ and attaining the apex of the clypeus. Outer angles of the cheeks, a dot below each ocellus and sometimes a few short arcs on the front inferiorly, yellow. Pronotum nearly smooth; anterior submargin thickened and black, with about five yellow points indicating as many very obscure longitudinal lines; hind edge moderately concave. Scutellum black with traces of four longitudinal pale lines. Beneath deep black, the narrow edge of the ventral segments paler, propleura margined with yellow behind. Legs soiled yellow; claws and basal joint of the hind tarsi black. Tergum black, narrowly margined with pale. Elytra fuscous-brown; nervures pale bordered with blackish; costa bright yellow as far as the antiapical areoles with a blackish border within, which extends over the apical areoles and includes two crescentic white marks beyond the yellow costal vitta; extreme apex white.

Genital characters : Valve longer than the last ventral segment, obtuse, brown edged with pale. Plates about one half longer than the valve, narrowed at the apical third ; brownish yellow clouded at base, with a few long pale submarginal spines.

Mississippi. Described from two males received from Mr. Howard Evarts Weed.

ENTOMOLOGY FOR BEGINNERS—PACKING INSECTS FOR TRANSPORTATION.

BY H. F. WICKHAM, IOWA CITY, IOWA.

By request of Mr. Fletcher I add a few remarks to his article in the January number on "Killing, Preserving and Relaxing Insects," though the subject is so well treated there as to leave little room for additional comment.

The action of the cyanide bottle cannot be depended on as effectual in such a short time as Mr. Fletcher mentions, except in the case of the most tender insects, many Rhynchophora will live there for several hours unless the bottle is quite freshly prepared, and I know of one case in which a *Coelocnemis* remained alive all night confined in a bottle strong enough to quickly overcome the large southwestern species of *Cleonus*. For most northern and eastern insects, however, a short space of time in the bottle is sufficient.

The tubes spoken of should be made of tolerably stiff paper—old envelopes answer nicely—but it should *not* be coloured, as by the common mode of relaxing the insects while still in the tubes there is danger of staining the more delicate ones. Each tube should have a compact wad of cotton placed in the bottom, then the insects (if they are elongate species or have long legs and antennæ) should be carefully dropped or pushed in, head foremost, so as to reduce to a minimum the danger of breakage. Now place another wad of cotton on them and close up the tube, which may be easily done by tucking in the edges with the fingers. In the case of such insects as Pterostichus it is my practice to place four specimens, say the size of *mutus*, together in a bunch so that the heads all point the same way and the legs lie close together, the backs being outermost ; now by introducing the heads of all at once into the open end of a tube a little pressure on the posterior extremities will pack them nicely in place. After they are in, if it is desired to put another set of four in the same tube it is much better to place a small but firm wad of cotton between the two in order to protect the antennæ of the second lot from interfering with and perhaps breaking the hind tarsi of the first. Round insects with short legs such as Byrrhidæ and Histeridæ need no such care. They may be dropped in one after the other only taking care that the cotton is packed tightly enough to prevent any rolling around.

In relaxing insects that have been put up in tubes I much prefer to remove them first, as wet cotton clings to legs and claws so much more tenaciously than dry. Others, however, may find it easier to disengage them from this sticky cotton than to handle them dry.

Never pack these tubes, containing insects, in a tight tin box for they are almost certain to mould and spoil. Be also careful not to pack insects loose in cotton unless you want to leave most of the antennæ and legs behind. I remember that during the first year spent in the southwest I put up a lot of *Eleodes*, *Embaphion*, etc., in cotton—simply putting first a layer of cotton in the box and then one of insects—and hardly a specimen came out whole.

The method I now use, in packing for transportation insects of considerable size, when taken in numbers, is that recommended by Drs. Leconte and Packard. Taking a box of the right size (thread boxes do nicely for insects the size of *Nyctobates* or smaller) a layer of cotton about one-eighth of an inch in thickness is first laid neatly on the bottom. Over this a piece of thin tissue paper is placed; next I take a wisp of cotton and roll it between my hands, making a roll long enough to reach along one side of the box, with two more, one for each end. Now, beginning at one end of the box place your beetles in an even row all along one side, having first laid the roll of cotton in to keep the heads from touching the box. When that row is full make another roll of cotton, place it carefully back of these beetles, to keep the next row from touching them, and put in more beetles as before. When one whole layer is in position on the tissue paper, cover them first with another piece of paper, then another layer of cotton, then more paper, followed by another layer of beetles. From a written description this seems a tedious process, but it is much quicker than putting them in tubes, and is absolutely safe. Specimens of beetles are bound to carry if packed thus in wood or pasteboard boxes strong enough to withstand such pressure as they may be subjected to—but never use tin.

My remarks apply chiefly to beetles, and I do not recommend these modes of preparation for soft-bodied or delicate insects like the Neuroptera or Lepidoptera.

NOTES ON NORTH AMERICAN HESPERIDÆ.

BY EUGENE MURRAY AARON, PH. D., PHILADELPHIA, PA.

From time to time for the past ten years I have been in the habit of receiving, from various collectors in this country and Europe, specimens of North American *Hesperidæ* for comparison and identification with my large collection, which has been justly famous for its completeness. As this collection is now no longer in my possession, being now the property of my friend C. B. Aaron, of Philadelphia, and as I have transferred my allegiance from entomology to ethnology it has occurred to me that it will be well for me to give here to the students of the *Hesperidæ* the benefit of such tables, notes and compilations as have, in years past, been of value to me in the identification of the species in this difficult family.

KEY TO SOME OF THE GENERA OF HESPERIDÆ.

Knob of antenna bent or curved..............................A.
Knob of antenna straight..............................B.

A. { Knob abruptly bent..............................C.
Knob curved..............................D.

C. { Bent portion of knob not over ⅓ entire length............E.
Bent portion of knob a long fine point, often as long as remainder of knob......................*Eudamus*.

E. { Abdomen reaching or surpassing the anal angle. *Pamphila* (1)
Abdomen scarcely reaching anal angle......*Amblyscirtes*.

D. { Knob of antenna elongate or ovoid...............*Pyrgus* (3)
Knob of antenna spindle-shaped.......................H.

H. { Hind wings angulated or crenulated...........*Systasea*.
Hind wings not angulated or crenulated..........K. (2)

K. { Two basal joints of palpi bright coloured beneath.........................*Pholisora*.
Two basal joints of palpi black or fuscous beneath.........................*Thanaos*.

B. { Tibiæ with spurs..............................M.
Tibiæ without spurs.....................*Carterocephalus*.

M. { Last joint of antenna rounded, no spine.................N.
Last joint of antenna with short slender spine...*Ancyloxypha*.

N. { Antenna ⅓ length of primaries, tibiæ nearly naked. *Copæodes*.
Antenna ½ length of primaries, tibiæ with long hairs..............................*Thymelicus*.

It must be remembered in using this table that it is arranged largely to aid in the differentiation of species along the generic lines at present accepted by most American Lepidopterists. The following remarks will show wherein it is believed to be defective in nature. The numbers refer to those used in brackets in the table :—

1.—Speyer has pointed out, in the first edition of Edwards's Catalogue, the variability in the antennal knob in the genus *Pamphila* as at present characterized. Close examination will show that in *Leonardus*, *Nemorum*, *Phylæus*, *Uncas*, *Comma*, *et al.*, the bent portion is not more than ¼ as long as the basal portion of the knob, and in *Leonardus* it is often a thick cone-shaped piece. In an example of *Metea*, in the collection of the American Entomological Society, the same cone-shaped termination is present, while in a species in the collection formerly in my possession, the terminal spine was nearly as long as the basal portion. Speyer accredits to *Metea* a thick blunt cone.

2.—In describing the new genus *Luitneria* (now *Systasea*), Speyer compares it with *Thanaos (Nisoniades)* and I have here, consequently, used the crenulation of the wings as a differentiating character. This, however, will not do in the case of *Nessus*, which Mr. Edwards now strangely places with *Pyrgus*. In my opinion both *Zampa* and *Nessus* belong to one genus, and the erection of the genus *Systasea* was an unnecessary burden to the synonymy.

3.—I have made no allowance for the genus *Leucochitonea* for the simple reason that I do not believe it can be separated from *Pyrgus* along any lines so far accepted by Speyer and others as affording generic demarkation. A specimen of *Pyrgus oceanus*, formerly in my possession, has one antenna true to Speyer's rule, while the other is distinctly as in *Eudamus pylades*. This might be taken to be a sport were it not for the fact that it is along this line that the species of the genus, otherwise closely related, are divergent.

The genera *Pyrrophaga*, *Erycides* and *Megathymus*, I have not attempted to define here. It has been my purpose simply to compile a table that would aid in the separation of those species commonest in American collections which my acquaintance with such collections leads me to know are most frequently misnamed and misplaced. In subsequent papers I shall discuss certain specific differences which are most likely to be confusing to students of this little-understood family.

NEW NORTH AMERICAN MICROLEPIDOPTERA.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Teras comandrana, n sp.

Expanse of wings 13 mm. Head, palpi, thorax, and basal half of forewings, light yellowish-brown or fawn coloured. A large cinnamon-brown triangular spot rests on the costa, extending from the middle to the outer fourth, and the apex extends nearly half way across the wing. The outer part of the wing is light cinnamon-brown, and the whole surface is crossed by numerous oblique, irregular, metallic bands, which are visible only in an oblique light. A row of minute black tufts along the inner side of the costal spot, two or three more near the fold below, one on each side of the fold at the basal third of the wing, and three near the middle of the wing at the outer fourth. Fringe concolorous with the outer part of the wing.

Upper side of the abdomen, hindwings above and beneath, and the underside of the forewings, light steel gray, with a silky lustre. Fringes lighter.

The larva of this species which was found in Amherst, Mass., May 24, 1890, feeding on *Comandra bellardi*, is light green above and much lighter beneath. The head and thoracic shield are jet black, with the usual scattering hairs ; the other segments have the usual protuberances of a whitish colour. This larva pupated June 11th, and the moth emerged June 21, 1890.

Described from three examples, one from Amherst, Mass., and two from Pennsylvania. I have two others from Texas which differ from the above description only in being much lighter in colour.

Cacoecia magnoliana, n. sp.

Expanse of wings from 21 to 25 mm. Head, thorax and forewings, fawn coloured, the last somewhat darker and with purplish reflections on the middle field. The costal fold of the male, and the costal spot are cinnamon coloured ; and there is an oblique, elongated, reddish-brown spot arising from near the base of the hinder margin, a similar spot rests on the fold below the outer part of the cell, and a smaller, elongated spot of the same colour lies in the outer part of the cell. These three spots are dimly outlined with whitish scales. The outer part of the wing is dull whitish, and crossed by a somewhat ill-defined, smoky-brown, curved band, extending from the costal spot to the anal angle. The outer edge of the wing is marked with black reticulations from the apex, where they are widest, nearly to the anal angle.

The hindwings and abdomen above are pale fuscous. The under side of the forewings is pale fuscous, lighter along the costal and hinder margin. The under side of the hindwings is pale yellow with fuscous reticulations at the apex.

Bred from *Magnolia acuminata* by Mr. M. V. Slingerland at Ithaca, N. Y.

Pyrausta magdalena, n. sp.

Expanse of wings 16 mm. Head ochre-yellow with a whitish line over each eye. Labial palpi, nearly as long as the head and thorax, porrect, laterally compressed, slightly bushy, whitish within, ochre-yellow along the middle of the outside, and fuscous along the edges and at the end.

Thorax, ochre-yellow with a metallic stripe on each side, extending from the head back across the patagiæ.

Forewings ochre-yellow with a very slight reddish tinge along the costa Three metallic stripes extend outward from the base of the wing, one along the costa, and one along each margin to a similar stripe which starts from the basal third of the wing and curves around to the middle, where it joins the central stripe, then runs obliquely across to the middle of the hinder margin. Two parallel curved stripes cross the wing near the outer margin, the inner one of which is more or less bent inward on vein 2. All these stripes are metallic and edged on each side with black scales.

Described from three examples, one from Texas and two from Florida.

I take great pleasure in naming this beautiful little moth for a most estimable lady, the wife of Rev. Geo. D. Hulst.

I formerly supposed this species to be *Botis plumbofascialis*, Led., which he said was from North America ; but this was a mistake, as his type is labelled "S. Africa," and proves to be the same as *Botis plumbatalis*, Zell. Mic. Caff. p. 47.

Coleophora fletcherella, n sp.

Expanse of wings from 10 to 12 mm. Head, palpi and basal joint of the antennæ, yellowish steel gray. Body, legs and wings above and beneath, plain steel gray, much more intense in fresh specimens.

The palpi are without tufts, the basal joint of the antennæ with a slight tuft, and the remaining joints of the antennæ and also the joints of the tarsi are steel gray annulated with white.

The cases are brown, composed of a portion of the leaf. cylindrical or fusiform, slightly compressed laterally, and with a more or less distinct ridge above and beneath. The mouth is more or less oblique, with the edge flaring out slightly. One side of the case is covered with fine hairs while the other is smooth, showing that the larva constructs its case from the upper and under sides of the leaf.

Described from three specimens received from Mr. James Fletcher, for whom I name this species, and who bred it from apple. I have also received the same species from Prof. Lintner who also bred it from apple.

NOTES AND DESCRIPTIONS OF BOMBYLIDÆ.

BY D. W. COQUILLETT, LOS ANGELES CAL.

Exoprosopa, Macq.—At the present time no little confusion exists in regard to those species in which the brown of the wings does not form crossbands, and I am unable to give a table for separating these species that would be of much use to the student. Those species from the United States which possess crossbands of this kind, and which always have the anal and axillary cells more or less brown. may be tabulated as follows :—

1. Wings brown, the apex broadly, and a large spot in the discal cell, hyaline.............................*emarginata*, Macq.
   Wings not marked like this.................................2
2. The brown crossband at apex of discal cell reaches the hind margin of the wing.......................................3
   The brown crossband does not reach the hind margin..............4
3. A pure hyaline crossband near base of wing...... { *caliptera*, Say. / *dorcadion, O. S.*
   A yellowish but never pure hyaline crossband near base of wing.......................................*decora*, Lw.
4. Extreme apex of marginal cell hyaline..........................5
   Extreme apex of marginal cell brown..............*fascipennis*, Say,
5. With a brown spot at base of vein between the second and third posterior cells.......................................6
   Without this spot, the wing at this point being pure hyaline.*grata*, n. sp.
6. Base of discal cell more or less hyaline.........................7
   Base of discal cell wholly brown....................*eremita*, O. S.
7. First posterior cell open,or closed near the margin of the wing.*doris*, O.S.
   First posterior cell closed and long petiolate............. *iota*, O. S.

Exoprosopa grata, n. sp.—Black, lower part of front, face except in the middle, sides of anterior half of oral margin broadly, scutellum except its extreme base, sides of abdomen on basal half, venter except sometimes at the apex, reddish, legs sometimes also reddish. Tomentum of front and face brassy yellow, the pile black; face concave, considerably produced below; proboscis never projecting more than the length of its labellæ beyond the oral margin; first joint of antennæ three times as long as the second and about equal to the third, the latter in profile gradually tapering from base to apex, about twice as long as the terminal style; tomentum of occiput silvery white. Tomentum of thorax mixed black and brassy yellow, pile of dorsum black, that of ends and sides yellowish, the bristles black; pile of pleura light yellow, that above the middle coxæ white, on all the coxæ mixed yellow and black. Pile and bristles of scutellum black, the tomentum mixed black and brassy yellow. Tomentum of abdomen black and brassy yellow, the yellow forming a crossband at base of the second segment and a large spot on each side of the third, fourth, fifth and sixth segments, most extended on the fourth where it forms a broadly interrupted crossband; tomentum of the seventh segment silvery white; pile of sides abundant, that on the first segment and anterior third of the second yellowish, on rest of abdomen black; tomentum of venter white, mixed with a few black ones posteriorly, the the pile yellowish and black. Tomentum of legs mixed black and brassy yellow, front tibiæ destitute of bristles, clause of front tarsi scarcely perceptible. Wings hyaline, costal cell yellowish, base of wing to beginning of basal cells brown, the hyaline part with two brown crossbands; the first one begins at costal cell in base of the marginal, fills apical half of the first basal, apical fourth of the second basal, base of discal and extreme base of the third posterior, basal third of the fourth posterior, last half of the anal cell except its extreme apex, also fills last three-fifths of the axillary cell, besides forming a border to the extreme base of the second vein; the second brown band fills the middle third or more of the marginal cell reaching apex of the costal cell, crosses the first submarginal and first posterior cells near the middle of each, fills extreme apex of the discal and the upper corner of base of second posterior cell, not reaching the third posterior cell. Length 13 to 16 mm. Merced County, California, and Washington. Four specimens; in July.

Nearest related to *eremita*, O. S., but readily separated from it, and from *doris*, O. S., by the second brown crossband of the wings never reaching the third posterior cell, and also by the fact that the crossband of light coloured tomentum on the fourth segment of the abdomen is always broadly interrupted in the middle.

Exoprosopa iota, O. S.—Originally described from Mexico. I have specimens which I collected in Los Angeles county, California. It is almost certain that this is simply a form of *doris* in which the first posterior cell is closed and petiolate. In the CANADIAN ENTOMOLOGIST for January, 1887, pages 12 and 13, I called attention to the variability of this character in specimens of *doris* captured at the same time and place, stating that in view of this fact Rondani's proposed genus *Argyrospila* must be rejected—an opinion previously expressed by the learned Austrian Dipterist, Dr. Schiner, but which fact I was not aware of at the time of writing the article above mentioned.

Geron, Meigen.—Up to the present time but a single species belonging to this genus has been reported from the region west of Texas; this is *albidipennis*, Loew., which is not rare in Southern California. My collection contains two other as yet undescribed species from this State, both of which will be readily distinguished from the above species by the form of the third antennal joint. In the latter this joint when viewed from the side is seen to taper very gradually to the tip, the outline being narrowly lanceolate, about six times as long as broad. The other two species may be characterized as follows:—

Geron fasciola, n, sp.—Head black, front and face silvery white pollinose in the ♂, light grey in the ♀, very short, sparse white pilose; first joint of antennæ one and a fourth times as long as the second, the third joint one and a-half times as long as the first two, in profile scarcely more than twice as long as broad, tapering slightly to the apex, which is obliquely truncated and bears a small tubercle which extends obliquely upward; proboscis, excluding the labellæ, one and a-fourth times as long as the head, tip of palpi reaching its middle, occiput light grey pollinose, and sparse white pilose. Thorax black, the margins light gray pollinose, that in middle of dorsum brown, continued in two median lines anteriorly; very short sparse white pilose; pleura, coxæ and scutellum light gray pollinose and sparse white pilose. Abdomen black, hind margin of each segment white, most extended on the first segment; entire dorsum light gray pollinose and sparse white pilose; venter white, sparse white pilose. Legs black, light gray pollinose, apex of each femur narrowly, basal half or more of each tibia, and base of each metatarsus, yellow, the pile sparse, white ; no bristles nor spurs. Wings pure hyaline, veins yellow, the costal from apex of auxiliary to apex of fourth vein brown ; small cross-vein at or slightly before the middle of the discal cell, great cross-vein straight, last two sections of the third vein subequal in length, apex of second submarginal cell half as long as the last section of the third vein. Length 2½ to 4 mm. Merced County, California. Five males and four females in August.

Geron capax, n sp.—Black, light gray pollinose, that in middle of dorsum of thorax brown, in the ♀ continued anteriorly as two median lines, but in the ♂ the entire dorsum is brown, with the exception of two indentations on the front end and a smaller one each side, situated on the thoracic suture : pile of entire body sparse, whitish. First joint of antennæ nearly twice as long as the second, the third joint twice as long as the first two, in profile four times as long as wide, of nearly an equal width, the upper corner cut away for half the width of the joint, leaving the lower half projecting far beyond it, the apex broadly rounded. Proboscis, excluding the labellæ, one and a-half times as long as the head, tip of palpi reaching its last third. Base of each abdominal segment darker than the remaining portion. Wings hyaline, apex of subcostal cell yellow, the veins brown ; small cross-vein slightly before middle of discal cell, great cross-vein bisinuate, last two sections of the third vein subequal in length, apex of second submarginal cell one-third as long as the last section of the third vein. Length 6 mm. Orange County, California. Two males and three females.

The colour of the halteres is not the same in any two specimens. The relative length of the proboscis is also variable ; in one of the males it is fully two and a-half times as long as the head.

A SARCOPHAGID PARASITE OF CIMBEX AMERICANA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

Recently Professor Aldrich, of Brookings, So. Dakota, sent me two specimens of a Sarcophagid which he had bred from *Cimbex*. They prove to belong to the old genus *Sarcophaga*, and are described below. It seems impossible to identify them positively with any of the published descriptions.

Sarcophaga cimbicis, n. sp. ♂.

Eyes dark brown, bare ; front one-fifth width of head, silvery white, frontal vitta slate-black, about one-half width of front ; sides of face and facial depression silvery white, with a brassy lustre, the sides of face with a row of bristles below near the eye-margin ; cheeks silvery, wide, bristly : vibrissæ stout, decussate, inserted on oral margin, facial ridges bare except several short bristles above vibrissæ ; frontal bristles descending to base of third antennal joint, two posterior pairs directed backward, no orbital bristles ; antennæ blackish, third joint hardly twice as long as second, moderately wide ; arista concolorous, 3-jointed, thickened on basal third, plumose on basal half or more ; proboscis brownish, almost as long as height of head, stout ; palpi blackish, moderately stout, bristly ; occiput silvery white, covered with black bristles. Thorax silvery white, with three heavy black vittæ ; scutellum silvery white, with a subapical divergent pair of macrochætæ, a very weak decussate apical pair of bristles between them, a decussate weak subdiscal pair of bristles, and two lateral pairs of macrochætæ. Abdomen about as wide as thorax, silvery, marbled with gray, with a more or less distinct median dark line ; hypopygium rufous-yellow ; first and second segments with a lateral macrochæta ; third with about three lateral, a median marginal pair, and some shorter marginal bristles between : anal with a marginal row of about twelve. Legs blackish, femora silvery white, tibiæ bristly, claws and pulvilli elongate, pulvilli smoky black. Wings grayish hyaline, longer than abdomen ; apical cell widely open before tip of wing, fourth vein with wrinkle and slight stump at bend ; apical cross-vein deeply bowed in, hind cross-vein sinuate, nearer to bend of fourth vein ; tegulæ nearly white, halteres tawny yellowish.

♀. Differs as follows : Front nearly or quite one-third width of head, frontal vitta about one-half width of front ; three hind pairs of frontal bristles directed backward, the hindmost pair much the longest and the forward pair of the three much the shortest ; two stout orbital bristles directed strongly forward. The weak decussate apical pair of bristles on scutellum is apparently wanting (there are no scars apparent), the weak subdiscal pair of bristles are not decussate. Abdomen broadened, much wider than thorax, macrochætæ nearly the same ; anus rufous-yellow, fringed with marginal bristles. Claws and pulvilli much shorter.

Length of body, 7 to 8 mm.; of wing, 6½ to 7 mm.

Described from one male and one female, bred by Professor J. M. Aldrich from cocoons of *Cimbex Americana*. Issued May 30 and June 2. Brookings, So. Dakota.

OVIPOSITING IN THE GENUS ARGYNNIS.

BY HENRY SKINNER, PHILADELPHIA, PA.

I wish to make a contribution to the literature of the subject of "egg dropping," and place on record in an entomological journal an observation I made nine years ago. I do this with the object of calling general attention to this subject, which I think an interesting one, and in hope that lepidopterists may be on the look out for this method of ovipositing in all the species of the genus. In the Proc. Acad. Nat. Sci., Phil., vol. 35, p. 36, I called attention to the fact that *Argynnis cybele* deposited its eggs while on the wing, or in other words, dropped the eggs from a height to the herbage below. Mr. Scudder in Butt. East. U. S. and Can., vol. 1, p. 560, says : "The eggs are laid upon the leaves and stalks of the food plant, *and not*, *as stated by* H. Skinner, dropped from a distance upon the herbage." He further says: "It is not an altogether uncommon thing for an egg to become attached to the scales at the top of the abdomen of a butterfly, or upon one of the hind legs ; and it is possible that in the movement of the wings in flight or poising, such an egg might have been swept or brushed off during Mr. Skinner's observation." Mr. Scudder tries to disprove my statement by a very ingenious supposition. I call attention to the method of ovipositing he describes, to see if anyone has ever observed it. I did not state that *Argynnis cybele* invariably dropped its eggs, but I have since learned that this method is by no means uncommon in the genus. I have repeatedly observed *A. myrina* hovering over wet fields, where violets grew in the herbage, dropping its eggs indiscriminately about. In this journal, vol. XXI., p. 130, will be found some remarks on this subject, and in a foot note it is stated that Mr. Aaron has observed the same habit in *A. bellona*, and is strongly of the opinion that strange motions frequently observed in *A. diana* in Tennessee are to be accounted for in the same way. The subject under discussion was brought fresh to my mind by reading the very interesting article by Mr. Wright (Mar. No., vol. 24) who says :— "Different species of *Argynnids* have different methods of ovipositing, *but none that I know of require a plant.* Other species, as *semiramis*, oviposit *on the wing without ever alighting*, but hovering over suitable places dropping the eggs at pleasure." I was greatly pleased too, on reading the above, to find my early observation confirmed by such an acute observer. I can give no reason for this method, and Mr. Wright's reason for such actions would hardly hold good here. He says :—"The reason for this peculiar habit seems to be to avoid small lizards which abound and which are alert to seize any flying insect." The species which have been observed dropping their eggs are *cybele*, *semiramis*, *myrina*, *bellona*. *diana (?)*. Are there others ?

NOTES ON MELITTIA CETO, WESTW.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

The notes on this species by Dr. Kellicott, in the February number of the CANADIAN ENTOMOLOGIST, induce me to place on record some of the observations made by me during the past year and used in my annual report ; and also to call attention to a very old record that in part answers the question -- Is the species double-brooded ? Looking over the MSS. drawings by Abbot in the British Museum, I found a picture of this species, and to it the following note :—"The caterpillar of this sort lives in and eats the stalk of Cymbling vines, pale brownish white, resembling a maggot ; spun up in the ground 16 July, bred 11th Aug. Also taken 19th July. It flies in the day, frequents cymbling and pampion vines ; not common."

This record refers to the vicinity of Savannah, Georgia, and is definite enough to prove that an early brood comes to maturity in July and August, leaving quite a sufficient time for a second brood of larvæ to mature in early October. I believe the occurrence of Dr. Kellicott's specimen in late August to be abnormal, and not a usual thing in that locality. In New Jersey I feel convinced that we have but a single brood, one that has a long period of flight and is of slow growth in the larval stage. Near New Brunswick, N. J., the moth does not appear until the middle of June, and on Long Island, as I am informed, the latter part of June and early July is the date of the first appearance. A much earlier date would be destructive to the species since squash vines are not planted here until about the middle of May or later, and do not begin to be of size to support larvæ until June or July. On the 26th of June I found eggs numerous, but not until July 6th did the first larva appear, and the last of the eggs collected on the 25th June, hatched on July 11th, giving at least a 15 day period for the egg. Moths were still flying at that time and continued for some days later. It is interesting to note that just about the time eggs begin to hatch generally in New Jersey, Abbot records his larva as full grown and ready to spin up. The record of the capture of the imago on July 19th raises the other question :—Were these belated individuals of the spring brood, or abnormally early specimens of the summer brood ?

Eggs laid at about the middle of July would not hatch until early in August, at a time when those first hatched would already be nearly one month old. In September I found full grown and less than half grown larvæ together in one stem, and the full grown larvæ were getting ready to spin up. Those half grown at that time increased very slowly, and up to the first weeks in October were still feeding. Meanwhile, the larvæ that spun up early in September were quiescent within the cocoon, and up to date—February 23rd—none of them have transformed to pupæ. To get two broods into one season, all the periods must be considerably shortened and the development must be much more rapid.

For these reasons I believe that we have in New Jersey and northward one brood only ; that the time of appearance of the imago extends over nearly if not quite one month, and that six weeks may be the period of flight ; that at least 15 days are required for the eggs to develope ; that the larva requires from seven to eight weeks to come to maturity ; that the larva remains unchanged within the cocoon during the winter. The date of pupation and the period passed in that stage has not yet been ascertained. I hope Dr. Kellicott will be able to ascertain this positively, and thus complete the life history of the insect. The economic problem of how best to deal with the species need not be discussed in this connection, but is much simplified by the better knowledge we have of its habits.

OBITUARY.

THE ABBÉ PROVANCHER.

It is our painful duty to record the death, in his 72nd year, of the Abbé Léon Provancher, who for many years, despite great discouragements and disadvantages, laboured zealously and assiduously to develope and disseminate a knowledge of the natural history of Canada, and especially of his native province. He was born in 1820, at Becancour, Que., and for some years was Curé of Portneuf, and one of his earlier entomological writings was a list of the Coleoptera of that district. Compelled by enfeebled health to relinquish the regular and more active duties of the ministry, he removed to Cap Rouge, near Quebec, and devoted his remaining time and strength almost entirely to the study of the natural sciences. In 1869 he commenced the publication of the *Naturaliste Canadien*, and, notwithstanding many discouragements, completed in 1891 the twentieth volume, when its issue had reluctantly to be abandoned, through the Quebec Government refusing to continue the scanty annual grant it had received. As early as 1858 Provancher published an elementary treatise on botany, and in 1862 his Flore du Canada. Subsequently he devoted his attention specially to entomology, and in 1874 commenced his Faune Entomologique du Canada. Vol. I., treating of the Coleoptera, was completed in 1877, with three supplements in 1877, 1878 and 1879. Vol. II. was commenced in 1877 and completed in 1883, and contains the Orthoptera, Neuroptera and Hymenoptera. In 1885–1889 he published Additions aux Hymenopteres, and issued Vol. III. upon the Hemiptera, which was completed in 1890. He was also an enthusiastic conchologist, and his last publication was a treatise upon the univalve molluscs of the Province of Quebec. His writings include the account of a pilgrimage to Jerusalem, an excursion to the West Indies, treatises on agriculture, etc. He will be best known, however, by his entomological work, and as he described a large number of new species and genera, particularly of Hymenoptera and Hemiptera, it is sincerely to be hoped that his collections may be placed where the types will be carefully preserved and be accessible to students of entomology.

There is a disposition on the part of some American students to ignore the work of Provancher, and to accuse him of want of care, etc., in the determination of genera and species. The enormous disadvantages under which he laboured must, however, be considered, for he was remote and isolated from libraries, collections and fellow-workers, and in his writings he often laments the fact that so few could be found to take any active interest in his pursuits, or to assist him in his labours. His entomological work would have been more exact and complete had not the publication of the *Naturaliste* greatly interrupted his investigations, and forced him to spend much of his time in other directions. His labours had the result of starting natural history collections in some of the colleges in the Province of Quebec, but our French citizens do not appear to have any special leaning to the sciences he loved, and he has left behind him no entomological student of any distinction. Above all Provancher was an ardent Canadian, strongly imbued with love of his race, language and religion, and often in his writings he impresses these sentiments upon his readers. A few years ago he was elected a Fellow of the Royal Society of Canada, and he was also a member, active or honorary, of many other societies. W. H. H.

A NEW ISCHALIA FROM VANCOUVER ISLAND.

BY W. HAGUE HARRINGTON, OTTAWA.

Ischalia Vancouverensis, n. sp. Length 7½ mm. Flavo-testaceous, abdomen, disc of elytra and middle of antennæ purplish-black. Head deflexed, polished, prominently rounded between antennæ ; eyes moderate, emarginate, coarsely granulated ; antennæ reaching to apex of humeral pale spot, stout, first joint swollen, second small, remaining joints more elongated, gradually shortened, terminal joint acutely pointed, three basal and two terminal joints rufo-testaceous, intervening six blackish or piceous. Thorax bell-shaped, about as broad as long, rounded and elevated anteriorly with a shallow median sulcus, from which a carina runs to the posterior margin and projects in a sharp point ; a deep transverse impression in basal third ; base biemarginately truncate, with angles produced in blunt points ; scutellum prominent, rounded at apex. Elytra with disc depressed, flattened, strongly confluently punctured, a prominent humeral costa extending nearly to apex, marginal costa prominent, acute, disc purplish-black, elongate humeral spot and all the margin testaceous. Abdomen purplish-black, alutaceous.

Described from six males from Comox, Vanc. Isd., received from Rev. G. W. Taylor in a very interesting and valuable collection of Coleoptera of Vancouver Island. Differs from *Ischalia costata*, Lec., in having the head unicolorous with thorax and legs, the abdomen entirely purplish-black, etc.

CORRESPONDENCE.

THE CUCUMBER MOTH.

Dear Sir,—I have the pleasure of announcing the addition to the Canadian list of that attractive Pyralid *Eudioptis nitidalis*, Cram., captured by Mr. T. H. Hill, of this place, in his garden last summer. It is known as the Cucumber Moth, in distinction to its congener the Melon Moth, *E. hyalinata*, Linn., both of them reported to be at times quite destructive to these crops in the Southwestern States. It is now over ten years since I captured the first known Canadian specimen of *E. hyalinata*, and it has been rarely taken since, and it is not known to be spreading, so that *E. nitidalis* may never become to us anything more than an exceedingly desirable cabinet specimen. Mr. Hill has kindly surrendered his unique to the interests of the Society. He has also most generously contributed his only specimen of that rare beetle *Hydrophilus ovatus*, which was wanting in the Society's collection.

J. Alston Moffat, Curator.

London, Feb. 18, 1892.

Mailed April 28th.

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SYNONYMICAL NOTES ON SOME HETEROCERA IN THE BRITISH MUSEUM.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

During the latter part of September, and early in October, 1891, I spent two weeks in London, and most of the time in the entomological rooms of the British Museum. My aim was, primarily, to identify the noctuids described by Walker, and in this I succeeded, the MSS. incorporating the notes there made being now in the hands of the printer. So large is the material in this magnificent collection, that I found opportunity for only a very hasty glance at other families of the Heterocera, and on a few species only I made brief notes. So far as they are synonymic they are here given.

Alypia crescens, Wlk.

1856—Wlk., Cat. Lep. Brit. Mus., Het. vii., 1774.

This is the same as *Alypia grotei*, Bdv., Lep. Cal., 1868, 70. Walker's name has priority. I have not the reference to Herrich-Schæffer's *Agarista bimaculata*, which Mr. Grote, Bull. Buff. Soc. Nat. Sci. i, 31, doubtfully refers here. Mr. Stretch in 1876, Wheeler's Rept. v., 802, gives *bimaculata*, H.-Sch., as the species, and cites *grotei* as a synonym of it. *Alypiodes flavilinguis*, Grt., Trans. Kans. Ac. Sci. viii., is another synonym, *fide* Mr. Henry Edwards in Papilio iv., 13. The genus *Alypiodes* is probably a good one, and it is also probable that Herrich-Schæffer's name will be found to ante-date Walker's, so that the species will probably remain as given by me in the recent List.

Eudryas Stæ Johannis, Wlk.

1856—Wlk., Cat. Lep. Brit. Mus., Het. ix., 144.

The type is marked "Taken on the church door at Horsley Downs." There is nothing in the specimen or record to authorize the reference of this species as North American, and yet this is probably correct. The insect is like *grata*, with slightly suffused primaries and deeper yellow immaculate secondaries. It is probable that in some way the pupa of the insect was transported to England and through the vicissitudes encountered an aberration was produced. I have no hesitation in referring the species as a suffused aberrant *grata*.

Comacla simplex, Wlk.

Comacla murina, Wlk.

1865—Wlk., Cat. Lep. Brit. Mus., Het. xxxi., 276.

Both the above species are the same as *Vanessodes clarus*, G. & R., Trans. Am. Ent. Soc., iii., 176, and Walker's names, generic and specific, have priority. The reference above given refers to *C. murina*, Wlk. The reference to *C. simplex*, Wlk., I have mislaid in some way, and have not at present access to the books to replace it. The name is earlier than *murina*, however, if my recollection serves, and must stand for the species. This unites numbers 994, 995 and 991 of my list. East Florida is given by Walker as the locality for the species; but the specimens are probably from Texas. Quite a number of species credited to "East Florida" in the British Museum are almost certainly from Texas.

Cothocida nigrifera, Wlk.

1865—Wlk., Cat. Lep. Brit. Mus., Het. xxxii., 499.

This was described among the Limacodidæ by Walker, and is No. 1213 in my list. The type specimen is a species of *Crocota* with very dark primaries and almost black secondaries. I cannot recollect having before seen any species quite so dark in colour. The locality is given as "North America."

Arctia rhoda, Butler.

1881—Butler, Ent. Mo. Mag: xviii., 135.

Arctia ochreata, Butler.

1881.—Butler, Ent. Mo. Mag. xviii., 135.

The types of the above species are usual forms of *nais*, Dru., easily matched in any good series of specimens. The term *ochreata* applies to the common yellow form. These references are made in my list from the descriptions, and are now justified by the comparison of the types.

Arctia radians, Wlk.

1856—Wlk., Cat. Lep. Brit. Mus., Het. iii., 632, *Apantesis*.

The type is that form of *decorata*, Saunders, in which the primaries are almost immaculate, the pale colour reduced to a forked line on the median vein. If this form is distinct from *nais* Walker's name has priority, Mr. Saunders's species having been described in 1863.

Arctia dodgei, Butler.

1881—Butler, Ent. Mo. Mag. xviii., 135.

This is a poor specimen of *phyllira*, unworthy of even varietal rank. Mr. Butler suggested that this might be the Mexican representative of *phyllira*, though the specimen bore no locality label; but it is Drury's species itself, and not a representative of it.

Antarctia walsinghami, Butler.

1881—Butler, Ann. and Mag. N. H. ser. 5, viii., 311.

This is a strongly marked, deeply tinted *rubra*, perhaps worthy a varietal rank. The Museum specimen of *rubra* is almost as far from the normal type in one direction as the type of *walsinghami* is in another.

Achérdoa, Wlk.

1865—Walk., Cat. Lep. Brit. Mus., Het. xxxii., 451.

A. ferraria, Wlk.

1865—Wlk., Cat. Lep. Brit. Mus., Het. xxxii., 452.

This is the *Varina ornata* of Mr. Neumoegen, Papilio iv., 94.

Among the Abbot drawings in the Museum is an excellent figure of this species, noted as "Taken 27th March flying at night in a swamp near Savannah River. The only one I have met with." It is probable, from the close correspondence of the figure with the Walker type, that the latter is the original of the drawing. According to Mr. Kirby some of the Abbot specimens are in the British Museum, and doubtless this is one of them.

Bellura gortynoides, Wlk.

Described as an ally of *Datana*, but is a noctuid, and is an earlier name for *Arzama densa*, the generic term also being earlier than *Arzama*.

Hatuna semirufescens, Wlk.

1865—Wlk., Cat. Lep. Brit. Mus., Het. xxxii., 450.

This is *Schizura unicornis*, A. & S. In the Trans. Am. Ent. Soc., ii., 86, Messrs. Grote and Robinson cite *Edema semirufescens*, Wlk., xxxii., 424, to *unicornis*, and this species with the same specific, but other generic designation is referable to the same form.

Psaphidia resumens, Wlk., placed near *Edema*, is a noctuid, and is *Dicopis viridescens*, Wlk., = *D. muralis*, Grt.

Edema ? transversata, Wlk.

1865—Wlk., Cat. Lep. Brit. Mus., Het. xxxii., 427.

This is the same as *Ellida gelida*, Grt. In the Trans. Am. Ent.

Soc. ii., 86, Messrs. Grote and Robinson make this Walker species a synonym of *Janassa lignicolor*; but this is an error. The species is a very well marked one and not easily mistakeable for any other. It must be known in future as *Ellida transversata* and the specific name is not entirely inappropriate if the maculation be used as guide.

Heterocampa semiplaga, Wlk.

1861—Wlk., Can. Nat. and Geol. vi., 37.

This is *Heterocampa pulverea*, G. & R., Trans. Am. Ent. Soc. i., 185, pl. iv., f. 32.

The type of this species is in the collection of the Entomological Society of Ontario, part of the D'Urban material determined by Walker. In the 9th volume of the CANADIAN ENTOMOLOGIST Mr. Grote gives some notes on a number of the species named by Mr. Walker, but he seems not to have had all of Walker's papers, as he omits all reference to the species described in the one above cited. To the courtesy of Mr. J. Alston Moffat I owe an opportunity of examining these omitted species, and the above is one of them; the others are noctuids, to be elsewhere commented on.

Cossus basalis, Wlk.

Mr. Henry Edwards has published the synonymy of this species, and I desire here to merely call attention to the fact that the specimen described by Walker is figured by Abbot, who took it "19 August in oak woods." The synonymy is given under No. 1434, in my List of Lepidoptera.

Zeuzera pyrina, Linn.

Walker gives North America as a locality for this insect. This would be interesting if true, and would prove that the insect is not a comparatively recent importation as has been supposed. I have not been able to find anything either in the British Museum collection or in the records to warrant Walker's citation, and I am not willing to accept it as evidence without some decided support.

The above comprise all the notes made by me on the earlier series of Heterocera. The time at my disposal was limited, and it would require three or four days work at least to look over the material carefully. It is more than likely that some of the species which I did not see have been removed to other series where I did not keep a lookout for them. A few at least of the names are disposed of here.

CANADIAN GALLS AND THEIR OCCUPANTS—EUROSTA SOLIDAGINIS, FITCH.

BY WM. BRODIE, TORONTO.

" Attacking the Solidago or Golden Rod." " Quite common in eastern New York." " Slender, straight, smooth stalks of the Golden Rod quite often have one and sometimes two large, round galls or ball-like swellings upon them, an inch in diameter, when the stalk above and below is less than a quarter of an inch." " In the winter season most of them are found to be empty, with a round hole perforated in them, the worm having completed its growth, and the winged fly having come out through this perforation the preceding autumn. But occasionally one of these balls is found at this season without any hole in it. In these the worm is still remaining to complete its changes and continue its species the coming summer." Fitch, 1st N. Y. Report, 1855.

Galls spherical, from 15–30mm. in diameter. Average of 50 specimens 23 mm.; on stems and panicle branchlets of Solidago, sp. ? ; outside of gall hard and smooth ; colour pale straw ; interior uniform white, spongy, dense ; larva occupying a small, irregular, nearly central space ; from 1–10 galls on a plant, usually 2–3.

" This fly measures from 0.35 to 0.40 inch to the tip of the wings. Its body is of a pale brownish-yellow or a tawny whitish colour with two darker brown stripes above upon the thorax. The antennæ, mouth and legs are dull yellow, the face white, and the top of the head yellowish-brown, with a blackish spot at base where the three ocelli or simple eyes are situated. The wings are tawny brownish-yellow, with blackish clouds, and with several dots and veins of a lighter yellow. On the outer margin beyond the middle are two small triangular hyaline spots, and a third longer one inside of these. A large transverse hyaline spot on the apex and two large triangular ones upon the inner margin, the inner one being larger and prolonged upon the margin of the base. Upon the margin of the wing, in these large hyaline spots are some tawny yellowish dots or small spots, namely, three in the apical spot, one in the small triangular one, one or two in the larger triangular one, and three where this last spot is prolonged in the axilla." Fitch, 1st N. Y. Report, 1855.

" Brownish-ferrugineous with the head and legs more yellow ; front very broad ; scutellum very convex, with two bristles. Wings reticulated with fuscous having one limpid space at the costa and two at the posterior border scarcely dotted with fuscous. Long. corp. 0.26. Long. al. 0.26 inch." Loew. Mon. Dip. N.-A. Vol. I. p. 82.

I received a collection of these galls made at Carberry, Manitoba, by W. G. A. Brodie in Nov. '82, from the upper part of the stems and branches of a species of Solidago very common on the open prairie. These galls were unusually large, measuring 27–30 mm. in diameter. The producers, *Eurosta solidaginis*, Fitch, began to come out at Toronto May 2, '83, and parasites, *Eurytoma gigantea*, Walsh, a few days later, and also a parasite beetle bred from an *Eurosta* pupa case and identified by Dr. Hamilton, of Allegheny, Pa., as *Mordellistena nigricans*, Melsh. A collection of these galls made at Crowfoot Crossing, N. W. T., by W. A. Ducker, D. L. S., Nov. '83, reached Toronto Dec. 25, '83, gave producers and parasites May 22, '84. A collection made 50 miles north of Crowfoot Crossing, N. W. T., by W. A. Ducker, D. L. S., Dec. '83, producers, *E. solidaginis*, Fitch., came out at Toronto May 25, '84–May 29, '84; parasites, *E. gigantea*, Walsh, May 27, '84–May 31, '84; also three specimens parasitic beetle. A collection made 50 miles south of Crowfoot Crossing, N. W. T., by W. A. Ducker, D. L. S., Dec. '83, gave at Toronto the usual proportion of producers and parasites, *E. gigantea*, Walsh, but the parasitic beetles were numerous. A collection of 87 galls made at Oak River, Manitoba, by Mr. Harry Leigh, in the fall of '84, gave 50 specimens *E. gigantea*, Walsh, at Toronto, June 1, '85–June 6, '85. No producers nor beetles. A collection made at several points between Clearwater, N. W. T., and Portage la Prairie, Manitoba, by W. A. Ducker, D. L. S., in August, '87, arrived at Toronto during Industrial Exhibition, '87, gave producers June 4, '88–June 10, '88, and parasites a few days later. The lot consisted of 183 galls and gave 83 producers, 38 specimens of *E. gigantea* and 7 beetles.

I have had over 500 specimens of this gall from Manitoba and the Northwest provinces, and I think it very certain that none of the occupants come out in the fall season. I never found more than one occupant in a gall, producer or parasite. The larva makes no preparation for leaving the gall, the exit is made invariably by the imago after leaving the pupa case. The boring is done with the front, and it is very interesting to see the soft, flabby looking mass assume the shape of tools, square and triangular brotches, gouges, chisels and lancet-like points, and surprising to see how rapidly the hard shell of the gall is cut away. This gall seems to have a wide range over the Northwest provinces. In addition to the localities already given I have evidence of its occurrence at Turtle Mountain, Pelly, Edmonton, Regina, Prince Albert, and Calgary.

This gall is not found in the vicinity of Toronto nor in the adjacent counties ; but I am informed by Mr. Jas. Fletcher, Dominion Entomologist, that it is more or less common in the Ottawa region.

In May '84, I liberated ten pairs of *E. solidaginis*, in an untilled field, densly grown up with Solidagos, north of the city, but found no galls afterwards. In June '88 I liberated six pairs in a field east of the city, but no galls have been found.

Dr. Fitch gives the habitat "New York," and Osten-Saken, "Washington" (D. C.) There can be little doubt of the parasitic habit of the *M. nigricans* larvæ. None of the galls gave both beetle and fly ; the cells in the galls which gave beetles were similar to those which gave flies, and in all the galls examined—out of which came beetles—there were found fragments of *Eurosta* larvæ or pupæ.

The *M. nigricans* larvæ are most probably external feeders.

It is very desirable that some observer should take up this investigation, and from a careful examination of the immature galls determine the relation between the beetle and the fly.

A NEW DASYLOPHIA FROM FLORIDA.

BY ANNIE TRUMBULL SLOSSON, NEW YORK CITY.

Dasylophia puntagorda, n. sp.

♂.—Head and thorax appearing palest gray from admixture of pure white with cinereous. Abdomen, secondaries and ground colour of primaries sordid white. Primaries streaked longitudinally with blackish, which contrasts violently with ground colour. A diffuse, heavy, blackish shade runs obliquely from apex inward. A curved blackish line, reaching neither costa nor internal margin at outer three-fourths of wing. Submarginal row of distinct, blackish spots, two of which are much larger than the rest and margined with white. Costa interrupted near apex by white spots. Fringe sordid white, interrupted by blackish. Somewhat smaller than *D. anguina*, S. & A., and differing markedly from that species in its sharp contrasts of colour, which make it appear like a purely black and white insect. It has no ochreous shade. The antennæ resemble those of *D. anguina*, the pectinations not as long as in those of *D. interna*, Packard. Described from two males taken at light. Punta Gorda, Florida.

EARLY STAGES OF INDIAN BUTTERFLIES.

A new contribution to our knowledge of the *early stages of butterflies* has come *from Bombay*, where Messrs. Davidson and Aitken have published (Journ. Bomb. Nat. His. Soc., Vol. 5,) half a dozen coloured plates, excellently drawn by Mrs. Blathwayt, representing the transformations of sixteen species. Their published notes, however, cover no less than 94 species and run through all the families, and among them will be found many interesting things,—a chrysalis of Elymnias "suspended by the tail only, but in a rigidly horizontal position," a species of Abisara, one of the Lemoniinæ, whose larva has the head free, a gregarious Delias where the eggs are laid "in parallel rows with equal intervals," a Papilio laying, like our species of Polygonia, ten eggs in a column, Hesperidæ with fluffy secretions, and some where the transformations are open, and which in some cases have and in some have not a median girth. When we find this as the result of two seasons' work, and most of it of one, we can but wish long life to the authors. Seventy species of butterflies were reared the first year.

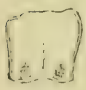
The course of insect life in India is so different from that with which we are familiar, and yet has so many points of contact, that it is worth while to transfer the following passage to our columns :—" In the case of a great many, perhaps the majority, of species, larvæ are found plentifully in June or July, that is, a short time after the monsoon bursts and vegetation starts into growth. These become pupæ, and for a time not a larva is to be seen ; then the butterflies of that brood emerge and lay their eggs and larvæ begin to appear again, but this time they continue for two or three months, in some cases until the end of the year. Then they cease and the butterflies also disappear, but a number of pupæ, and perhaps eggs, remain, to start into life when conditions are again favourable, which will be in March if the food-plant sprouts then, otherwise in June. Of these dormant pupæ a few come out at odd times, but the butterflies thus sent into the world out of season doubtless perish without offspring. This seems to be something like the order of events with many of the common species of Papilio, the Danainæ, the Junonias, and others ; but there are many species which do not follow this rule, and some seem to have only one short season in the year."

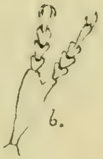
DESCRIPTION OF FOUR INSECT MONSTROSITIES.

BY H. F. WICKHAM, IOWA CITY, IOWA.

The following cases of insect monstrosities have come under my notice, and I have thought it best to make them known in order that those interested in this work might have access to the descriptions. While but little seems to have been written on the subject in this country beyond the describing of a number of interesting forms by Jayne (Trans. Am. Ent. Soc., VIII.) and Henshaw, Scudder and Hagen (Psyche), it has attracted considerable attention in Europe, many writers having published accounts, with figures, of more or less interesting cases. With this prelude I offer the following descriptions and figures. All the specimens are in my own cabinet, deposited in the Museum of the State University of Iowa:—

a.





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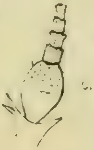

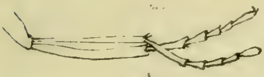

d.

Fig. *a* represents the thorax of a specimen of *Pterostichus validus*, Dej., in which the left side is much shorter than the right. There is nothing in its appearance that would indicate this malformation to be the result of an injury to the pupa, so it has been considered worth while to let this case go on record.

In fig. *b* is shown a rather curious though not particularly uncommon structure. It is the right anterior leg of a specimen of *Trichodes nuttalli*, taken at Iowa City in July, 1885. Here the tibia is somewhat stouter than normal, and from near the tip on the outer surface springs a branch, as shown in the cut, having a tarsus which, except for being a little slender, is almost identical with the other. The claws on this supplementary tarsus are, however, not well formed. Aside from this leg the specimen shows no departure from the average individuals of the species.

A curious monstrosity is seen in a specimen of *Polyphylla hammondi*, Lec., which I have tried to reproduce in fig. *c*. Here the right middle tibia (which is just perceptibly more slender than the normal left one) bears a five-jointed tarsus of the remarkable form shown. The first joint is sub-pyriform in shape, the smaller end articulating with the tibia; the remaining joints are smaller, and decrease regularly in width, also slightly in length excepting the last; there are no claws. The large basal joint has on the under surface a transverse impressed line running about half way across it a little before the middle ; the base is smooth for half the length, the remainder with rather large, tolerably close punctures ; near the tip is a small spine, not more than one-third of the usual size. The upper surface is covered with dense, recumbent, somewhat golden pubescence which obscures the sculpture. The remaining joints are all more or less scabrous, the second covered above with pubescence like that of the first, but the third, fourth and fifth only bear a few scattering hairs. The specimen is a male and is one of a number taken by me at Albuquerque, New Mex., in 1888.

The remaining example (fig. *d)* is that presented by a *Macrobasis tenella*, Lec., from Tucson, Arizona. The left middle leg is here affected, the femur having two tibiæ, each having its tarsus. What we may consider as the normal one departs but little, if at all, from the usual type, though it is possibly a little more bent ; the other is more slender, its tarsus weaker, the last tarsal joint being more like that of an antenna than of a leg. The accessory member is less perfectly chitinized than the other. Both tibiæ have the usual spurs at the apex, though they are partially hidden in the figure.

NEW SPECIES OF PHORA.

BY J. M. ALDRICH, BROOKINGS, SOUTH DAKOTA.

The following table includes only the species of *Phora* described by Loew, and four new ones—ten in all. *Phora atra* of European entomologists, together with *P. cornuta*, Bigot, *fuscipes*, Macq., and *rufipes*, Meigen, are said to occur in North America—the second in Cuba, the last two in the Hudson Bay region—but I have not seen the descriptions :

1. Middle tibiæ armed with bristles on the outer side below the knee ; frontal bristles all pointing upward, - - - - - 2
   Middle tibiæ unarmed on the outer side below the knee ; bristles of the lower edge of the front pointing downward, - - - 6
2. Halteres black or blackish, - - - - - - - 3
   Halteres white or whitish, - - - - - - - 5
3. Second heavy vein very thick and stout, - *pachyneura*, Lw.
   Second heavy vein not unusually stout, - - - - 4
4. Second heavy vein simple, the apex dilated, - - *clavata*, Lw.
   Second heavy vein forked, - - - - *cimbicis*, n. sp.

5. Hind tibiæ armed with two bristles below the knee, - *luggeri*, n. sp.
Hind tibiæ armed with one small bristle below the knee,
- - - - - - - - - *microcephala*, Lw.
Hind tibiæ with a row of small bristles down the outer side,
- - - - - - - - - *incisuralis*, Lw.
6. Head yellowish, - - - - - - - *scalaris*, Lw.
Head black or blackish, - - - - - - - - 7
7. Legs pale yellowish, - - - - - - *nigriceps*, Lw.
Legs brownish or blackish, - - - - - - - 8
8. The four lower frontal bristles strongly convergent, - *minuta*, n. sp.
The four lower frontal bristles parallel, - - - *setacea*, n. sp.

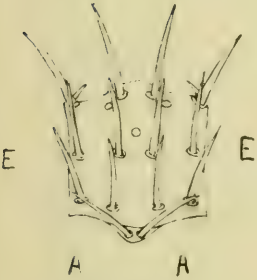

FIG. 1.
Phora cimbicis, female.
A.A. antennæ. E.E. eyes.

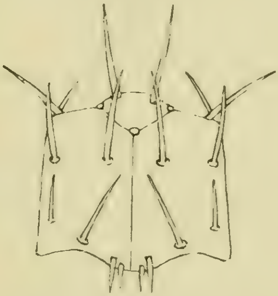

FIG. 2.
Front of Phora setacea, female.

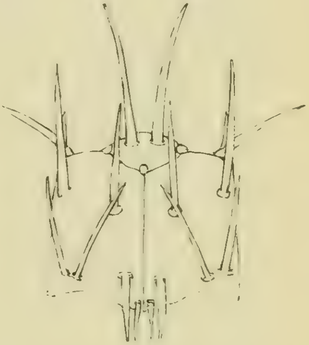

FIG. 3.
Front of Phora setacea, male.

Phora cimbicis, n. sp.

Head black, front broad, nearly square, comprising about half of the width of the head, below with an obtuse prolongation in the middle; no ocellar prominence; at the extreme lower edge of the front in the middle, are two bristles, directed upward and strongly outward. A few minute hairs, arising from coarse punctures, lean toward the middle line of the front. Antennæ brownish black. Palpi longer than antennæ, of the same colour, oblong, at the tip with about six stiff, short bristles. Proboscis short, stout, yellow. Dorsum of thorax black, the humeri distinctly separated; beginning at their posterior corners, a row of small bristles borders the dorsum. In all my specimens the region of the scutellum is injured by the pin; there is a longer bristle, however, on the dorsum, at the corner of the scutellum, and the latter is bristled behind. Pleuræ black, a little shining; a group of two or three bristles just below the prothoracic spiracle, and a pair at the base of the forecoxæ. Abdomen wholly satiny black like thoracic dorsum, except the first segment, which is whitish above in the middle; the last joint longer than the preceding. Halteres black, the pedicel a little yellowish at base. Fore and hind tibiæ with one, middle tibiæ with two, bristles on the outer side a little below the knee; the hind tibiæ have also a scattering row of three smaller ones, running down to the tip; the tips of middle and hind tibiæ armed with long spurs. The legs are wholly satiny brownish-black, except that the front ones are from the coxæ gradually lighter, ending in brownish-yellow tarsi, and that the middle tarsi, and sometimes the tibiæ, are also brownish yellow. Wings subhyaline; the second heavy vein is forked; the first light vein is nearly straight, and ends a little before the apex.

Length of body, 3 mm.; of wing, 2 mm.

Brookings, South Dakota.

Three female specimens, reared from *Cimbex americana*, Leach. Dates of emerging, May 24, 26, 27.

Phora setacea, n. sp.

♀. Head black, front very wide, at the middle of the lower border with two pairs of small bristles pointing downward, the smaller pair difficult to make out. Ocellar tubercle bounded by a suture which extends as a delicate line down the front. Antennæ fuscous. Palpi yellow, with black bristles. Proboscis yellow. Thorax black, with a few scattered bristles along the dorsal margin. Abdomen black, tapering, the last segment cylindrical, more or less retracted, the extremity yellow. Halteres very light yellow. Front and middle legs yellow, the hind ones more brownish. One spur at the apex of the tibia, except in the front legs, where there are none. Wings hyaline, the second heavy vein forked, the first light vein nearly straight, rather long bristles on costal border to end of second heavy vein.

♂. General colour same as ♀, but the bristles everywhere noticeably longer. On the lower edge of the front both pairs are quite prominent, leaning down but little. The coxæ have a few bristles on the outer and apical portions; the posterior coxæ have a conical protuberance on the hind side. The genitalia are exserted, lying close up under the back part of the abdomen. They consist of some shriveled clasping organs, the structure being unrecognizable. They arise apparently from the next to the last segment, leaving the last one projecting downward and backward from their base. The bristles upon the costal margin of the wing are unusually long.

Length of body, 1.2 mm.; of wing, 1 mm.

Brookings, South Dakota.

Four ♀ and one ♂ specimen, reared from *Cimbex americana*, Leach. Dates of emerging, June 1, 2 and 8.

Phora luggeri, n. sp.

Head brownish black, front very broad, at the lower border with two small, widely divergent bristles arising a little below the edge of the front. Antennæ and palpi brownish-yellow, the former with a yellow bristle, the latter with stiff black ones. Thorax brownish-black, with few and small bristles. Abdomen more or less yellowish at base above, the remainder brownish-black, the seventh segment long and tapering. Wings hyaline, the heavy veins yellow, the second hairy on the upper side to the point of division, which is near the end, the two branches so little divergent as hardly to be made out with a simple lens. First light vein strongly bowed at base, straight for the remaining two-thirds of its course, ending at the apex. Halteres wholly yellow. Legs wholly yellow; the front tibiæ with a bristle on the outer side below the knee, the middle and hind tibiæ with two each in the same situation. Middle and hind tibiæ with spurs at apex.

Length of body, 2.2 to 2.6 mm.; of wing, 2.5 to 3 mm.

Two female specimens from St. Paul, Minn. (Lugger).

In the other three new species the second heavy vein is bare, except a single fine bristle near its base.

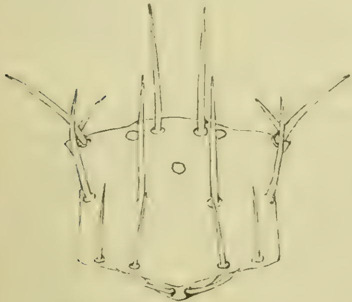

FIG. 4.
Front of Phora luggeri, female.

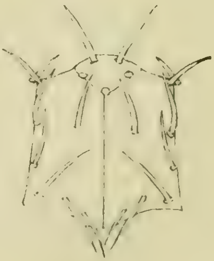

FIG. 5.
Front of Phora minuta, female.

Phora minuta, n. sp.

Head black the front broad, convex, with a few minute hairs slanting towards the middle line; the usual bristles rather small, arranged as shown in figure. Ocellar prominence defined by a very fine impressed line, which continues down the front. Antennæ brownish-black. Palpi brownish, with a few black bristles at tip. Proboscis small, yellow. Thorax uniformly black, with but few bristles. Abdomen black, tapering, the last segment slender and cylindrical. Halteres light yellow. Wings a little infuscated, except toward the posterior border. Second heavy vein forked near the end. Light veins four in number, the first nearly straight; costal margin with fine bristles to the end of the second heavy vein. Front legs yellow at the coxæ, gradually browner toward the tarsi, without any conspicuous bristles. Middle legs brown, one long spur at the apex of each tibia. Hind legs black, apex of each tibia with one long spur; about seven short bristles form a row down the back side of the apical half of the tibiæ.

Length of body, 1.2 mm; of wing, 1.3 mm. Brookings, South Dakota.

One ♀ specimen, reared from *Cimbex americana*, Leach. Date of emergence, June 1.

In preparing these descriptions I have been unable to make much use of the characters of the dorsum of the thorax, because this region is injured by the pin in most of my specimens. The smaller points of structure were determined with a compound microscope, mostly at 60 diameters, but occasionally with a higher power in the smaller species.

The accompanying sketches, though somewhat rough, will serve to show the number and arrangement of the frontal bristles. Frontal sutures, where present, are also shown. No attempt was made to draw to a uniform scale; and, as the point of view was necessarily not quite the same in all cases, the outlines given are not to be relied upon for the comparative shape of the fronts.

I shall be glad to receive specimens of Phoridæ from any North American locality, and will try to return any favours of this kind. As the species are all very small, the best method of mounting is as follows:— Cut a piece of cork (or pith) ⅛ inch square and ¼ inch long; near one end of this run through a No. 00 Klaeger pin till it projects nearly ¼ inch; cut off the head end close to the cork (with scissors, most conveniently); lay the little fly on its back on a smooth surface, and using a lens if necessary, introduce the point of the pin into its body between the middle legs until it has just reached the dorsal surface; then stick a stouter pin through the other end of the cork in the opposite direction from the first one, far enough so that about half will project below.

THE MOLE CRICKET—GRYLLOTALPA BOREALIS.

BY E. W. DORAN, COLLEGE PARK, MD.

In the January CANADIAN ENTOMOLOGIST Mr. James Fletcher had an interesting article on his "pet" mole cricket. At his suggestion I send a few notes upon the larval form of the same species.

On January 4 last, Mr. A. I. Hayward, connected with our State Experiment Station, brought me five larvæ of the mole cricket, which were found in rather a peculiar situation. He had a number of men putting up ice. The ice had been removed from a considerable space, when, wading around in the water with tall rubber boots on, he found the young mole crickets swimming around upon the water. It seems there was no connection between the open space and the land; besides, as the weather was very cold, they could not live upon or near the surface of the ground.

The only reasonable theory in regard to the matter is that they were buried in the mud at the bottom of the pond, which is a temporary one, having been flooded with water only a month or two. The wading through the mud dislodged them, when they at once came to the surface. However, there are some difficulties in the way of accepting this hypothesis. For example: Could the crickets exist beneath the water in the soft mud so near the surface for so long a time? Westwood says in regard to the European mole cricket, *G. vulgaris*, that the villose coating of the body and wings appears to protect them from the water. Our species has a similar coating of fine hairs; but in the larvæ especially it seems scarcely sufficient to protect it from the effects of the water in a prolonged submersion. Besides, could it live so long entirely surrounded by water, cut off from the air? They must have been in the thin mud very near the water to have been thus stirred out.

They seemed very little affected by the cold or their bath; in fact, they were as "lively as a cricket," and were apparently very much at home upon the water.

The life history of our American species, *G. borealis*, seems not to have been studied extensively. At any rate I have been unable to find figures or descriptions of the preparatory stages. It is stated that *G. vulgaris* requires three years to come to maturity, and *borealis* seems of very slow growth. When these specimens were taken they were but little more than half an inch in length. They are at this time (March 15) about .7 inch long. In two and a-half months they have increased in length but little over one-tenth of an inch, though they have been kept in a warm room and supplied with plenty of food, consisting chiefly of the roots of growing wheat, earthworms, etc. As the female deposits her eggs in early spring, they are probably nine or ten months old now. The mature insect is an inch and a-half long, while these are but little more than a third as long. Westwood says that *vulgaris* is inactive in winter. These have been active at all times ; that is, not in any sense torpid, nor were they when taken.

When I first secured them I put them in a jar of earth, and gave them no further attention for several days. In the meantime one disappeared, and probably served to satiate the appetite of the rest, as they are known to devour their own kind sometimes when they can obtain no other food.

Since then, in exhibiting another before my class, it was accidentally injured and died. I shall try to rear the remaining three to maturity, and figure the various stages. I cannot say what stages they have already passed through. The larvæ of *vulgaris* are white before the first moult. These were dark velvety, and had moulted once or twice, I suppose. They have not moulted since.

I have written these notes in the hope of calling out other observations upon the early stages of the insect. And I should be glad to know of any one who has studied or figured the preparatory stages.

FOURTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

In accordance with an action of the Association, taken at the Washington meeting, the Fourth Annual Meeting will be held at Rochester, New York, two days prior to the meeting of the American Association for the Advancement of Science.

All members intending to present papers are requested to forward titles to the undersigned before August 1st., in order that the programme may be prepared in proper season.

The proceedings of our meetings are attracting the attention of working entomologists of other countries, and it is to be hoped that members will spare no efforts to make the coming meeting even better than those which have preceded it. Owing to the continued ill-health of President Lintner, and in order to relieve him of as much labour as possible, all correspondence, unless of a nature necessitating his attention, may be addressed to the Secretary. F. M. Webster,

Secretary, Association of
Columbus, Ohio, May 10, 1892. Economic Entomologists.

NEW NORTH AMERICAN SPECIES OF GORYTES.

BY WM. J. FOX, PHILADELPHIA.

The monograph of this genus, published by Handlirsch,[*] necessitated the working-up of the unidentified species in the collection of the American Entomological Society. This author has merged several genera into *Gorytes*, viz., *Euspongus*, *Hoplisus*, etc. I have followed him, as several of the species described herein belong to what was once the genus *Hoplisus*. There are several other new species contained in the Society's collection, represented by single specimens only. The following table will separate the species described herein :—

- First abdominal segment not petioliform, nor coarctate.
  - Inner eye-margins almost parallel ; antennæ entirely yellowish. *tricolor*, Cr. ♀
  - Inner eye-margins distinctly converging towards the clypeus.
    - Flagellum long and slender, not or scarcely thickened towards the apex ; markings yellow.
      - Posterior face of metathorax not rugulose. *nevadensis* ♀ ♂
      - Posterior face of metathorax strongly rugulose. *atrifrons* ♀ ♂
    - Flagellum distinctly thickened towards the apex ; markings whitish. *albosignatus* ♀ ♂
- First abdominal segment petioliform ; joint 10 of the antennæ incised beneath. *mirandus* ♂
- First abdominal segment coarctate ; black, with the second abdominal segment red. *rufocinctus* ♀

GORYTES TRICOLOR, Cr.

G. tricolor, Cr., Trans. Am. Ent. Soc., I., p. 380, ♂, (non ♀).

♀.—Head not as broad as the thorax ; ocellar region rather distinctly raised, the ocelli forming a curve ; frontal furrow well marked ; clypeus with large, sparse punctures, convex, transversly-ovate, the fore margin a little incurved ; eyes almost parallel within ; front, vertex and occiput with strong, separated, punctures ; the cheeks smooth ; flagellum but little thickened towards the apex ; scape much longer than the clypeus is wide medially ; third antennal joint but little longer than the fourth, joints 4-6 about equal, the fourth if anything a little longer than the

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[*] S. B, Akad, Wien, XCVII., Heft. 6 & 7, pp. 316-562, pls. 1-3, 1888.

fifth. Thorax with very strong separated punctures, those on the scutellum very sparse ; basal triangular space of metathorax well marked, divided medially by a furrow, almost smooth (some specimens show traces of longitudinal and others transverse striæ); four posterior tibiæ and tarsi strongly spinose ; the anterior tibiæ strongly ciliated ; spur of anterior tibiæ obliquely truncate ; wings hyaline, a fuscous cloud covers the marginal, upper portion of third submarginal, the second submarginal and parts of the first, second and third discoidal cells ; stigma and costal nervure yellowish ; transverse medial and the cubital nervures of the hindwing interstitial. Abdomen with strong, separated punctures beneath the middle of the second and the basal half of the third and fourth segments, impunctate ; pygidium short and broad, the lateral carinæ or margines not extending to the base of the segment. Black ; a broad elongate mark on the cheeks, prothorax, dorsulum and mesopleuræ in part, the metathorax, except enclosed space at base and a somewhat similarly shaped mark on the posterior face, the legs, variegated with yellow, the first abdominal segment above, except apical margin, and the last two segments, all rufous ; face, clypeus, basal half of mandibles, antennæ, prothorax above, a large blotch on the mesopleura anteriorly, scutellum and a broad band on apical margin of segments 1–4 above, and on segments two and three beneath, all yellow ; the antennæ slightly inclining to brownish. Length, 10–11 mm.

Var.—One specimen from Colorado, instead of being black, is entirely rufous, but with the same yellow ornamentation.

Montana and Col.

GORYTES NEVADENSIS.

♀.—Head as broad as the thorax ; ocellar region rather distinctly raised ; ocelli forming a low triangle ; frontal furrow distinct, but not strong ; eyes distinctly converging towards the clypeus ; clypeus convex, with large, scattered punctures, the anterior margin a little incurved ; scape of antennæ not as long as the width of the clypeus medially, the flagellum long, not thickened ; third antennal joint about one-third longer than the fourth ; front strongly punctured, the occiput finely and sparsely so. Dorsulum with sparse, large punctures, with four impressed, parallel lines basally, which do not extend beyond the middle ; mesopleuræ with exceedingly fine punctures ; suture between dorsulum and scutellum foveolate ; enclosed space of metathorax strongly sulcate medially, with 9–10 strong radiating striæ on each side of the sulcus, the striations extending slightly over the margin of the enclosure; the posterior face is divided by a very strong sulcus, which begins at the apex of the basal enclosure; with the exception of a few coarse rugæ at the apex the posterior face is smooth, or with exceedingly fine punctures; the metathoracic stigmas are covered by a strong, somewhat flat-like production; wings sub-hyaline, with a yellowish tinge, the marginal, a part of the three submarginal cells fuscous, the veins enclosing the marginal, second and third submarginal and the outer vein of the third discoidal cells are black, the rest yellowish; transverse medial vein received by the externo medial nervure before the apex of the submedian cell of the hindwings; legs stout, the four hind tibiæ sparsely spinose; anterior tarsi distinctly ciliated, the bristles sparse and short, about half as long as the first joint. Abdomen glabrous, beneath with a few scattered punctures. Black; scape beneath, manibles medially, prothorax above, tubercles, two spots on mesopleuræ, broad line on scutellum, post-scutellum, two large ovate spots on the metathorax, femora beneath, except base, the base of tibiæ, the posterior coxæ beneath and the apical margins of abdominal segments 1–5 above, those on segments one and two emarginate in the middle, the base of the last segment laterally, beneath the apical half of the second, the third fourth and fifth entirely, all yellowish; tegulæ, tibiæ beneath and the tarsi more or less brownish. Length, 12 mm.

♂.—Differs from the ♀ as follows: Frontal furrow indistinct; the four anterior tibiæ and tarsi entirely yellowish; all the coxæ spotted with yellow beneath and ventral segments of the abdomen 3–5 not entirely yellowish; the third antennal joint about one-fifth longer than the following one.

Nevada. Two specimens.

GORYTES ATRIFRONS.

♀.—Resembles *nevadensis* very much, but differs as follows: Front finely and closely punctured; third antennal joint about one-fourth longer than the fourth; labrum ciliated with silvery hairs; metathorax posteriorly strongly rugulose; the first joint of the anterior tarsi is about equal in length to the three following ones united, whereas in *nevadensis* it is longer than the three following joints; the bristles with which the joints are ciliated are more than half as long as the first joint; the yellow bands of the abdomen are narrower, and the pygidium is larger; the scape and joints 3-8, beneath, brownish; the legs are yellow in a greater extent than in *nevadensis;* the head has, in addition to some spare pale hairs, which are prominent on the clypeus, a brownish-sericeous pile. Length, 10-12 mm.

♂.—Flagellum longer and more graceful than in the ♀, not brownish, the third joint a little longer than the fourth; clypeus, labrum, face, inner orbits broadly, scape and following joint beneath, yellow. Length, 10 mm.

Nevada. Four females and one male. Two of the females have the metathorax destitute of the yellow spots.

GORYTES ALBOSIGNATUS.

♀.—Similar to *atrifrons*, but is at once distinguished by the markings being whitish; the flagellum is gradually thickened; the ninth to eleventh antennal joints are not much longer than broad, the third joint about one-third longer than the fourth; the posterior face of metathorax strongly rugulose, having the appearance of being rugged; wings subhyaline, with scarcely a yellowish tinge; abdomen with the two basal segments shining, the remainder with a slight pile and a few indistinct punctures; pygidium short, a little longer than it is broad at the base, with large, scattered punctures; basal portion of clypeus, face, inner orbits—broadest beneath—scape, and following joint beneath, and a spot on the second and third ventral segments laterally, whitish; the apex of the femora tibiæ and tarsi, except the outer side of the two anterior pair, brownish. Length, 10-12 mm.

♂.—Flagellum long, not thickened, the third joint very little longer than the fourth; four anterior tibiæ and tarsi entirely whitish; the clypeus is not strongly punctured, as in the ♀. Length, 8 mm.

Montana. Four females, two males. This and the two preceding are closely allied.

GORYTES MIRANDUS.

♂.—Head a little broader than the thorax; front depressed medially, with strong, separated punctures, the impressed line distinct; eyes scarcely converging towards the clypeus; clypeus convex, rather strongly and sparsely punctured, the anterior margin incurved; flagellum long, thickened medially, but again narrowed to the apex, the third joint much longer than the fourth, the tenth joint excised beneath. Dorsulum and pleuræ with large, scattered punctures; the sutures of the pleuræ with short, strong striæ, or marked by foveæ, being strongest between the meso- and metapleura; scutellum punctured like the dorsulum; basal triangular space of metathorax well marked, strongly furrowed medially, obliquely striated, at the apex of this space there is a strong pit or excavation ; the posterior face irregularly striated; on the sides punctured, with an oblique, foveolate furrow ; hind tibiæ and tarsi distinctly spinose ; the anterior femora much broadened, flattened or depressed on its inner side on the basal portion ; wings subhyaline, iridescent ; the marginal cell and the apex of the wing, fuscous. Abdomen shining, petiolate—that is, the first segment is much narrower than the second, broader at the apex than at the base, segments 3-5 above and 2-7 beneath with large, scattered punctures, those on the first segment dorsally and ventrally, and on the second segment above, not so distinct ; last ventral segment bifid. Black ; clypeus, labrum, mandibles, except apex, face, inner orbits broadly, scape and third antennal joint beneath, the second joint entirely, posterior orbits, anterior margin of collar, prothorax above, tubercles, anterior portion of mesopleuræ, spot beneath tegulæ, an oblique line on the dorsulum by the tegulæ, scutellum, post-scutellum, a large spot on each side of the posterior face of the metathorax, legs, except the upper surface of the coxæ, trochanters and femora, a broad band on apical margins of all the abdominal segments above, the one on second segment broadest, and on the ventral segments, with exception of the base, all yellow ; the greater part of the antennæ and the posterior tibiæ and tarsi, in part, brownish. Length, 9 mm.

Nevada. Four specimens. Related to *notabilis*, Handl., from Mexico, but differs in having the tenth antennal joint excised beneath, etc.

GORYTES RUFOCINCTUS.

♀.—Ocelli placed in a triangle, the posterior pair connected by a curved furrow; clypeus with large punctures, its anterior margin incurved; eyes diverging towards the clypeus ; front having the appearance of being exceedingly finely granulated, the furrow distinct ; antennæ long and slender, the third joint much longer than the fourth. Thorax shining, the dorsulum with exceedingly fine and close punctures; the mesopleuræ with large, shallow, scattered punctures ; sutures between the dorsulum and scutellum, and the scutellum and post-scutellum, distinctly foveolate ; enclosed space on metanotum large, channelled medially and covered with beautiful, radiating striæ ; apical portion of posterior face roughened, the basal portion smooth, shining; wings subhyaline, nervures and stigma black ; a fuscous cloud fills the marginal, second submarginal and part of the third discoidal cells ; transverse medial nervure of hindwing confluent with the cubital nervure ; medial and posterior tibiæ and tarsi distinctly spinose ; anterior tarsi ciliated with long, white bristles. Abdomen with strong, sparse punctures ; the first segment strongly coarctate, before the apex above, with a deep wide, transverse furrow, which extends from side to side ; ventrally, the punctures are more distinct, especially on the last segment; last segment above strongly and sparsely punctured ; deep black ; shining; the flagellum beneath and the tarsi slightly brownish ; inner side of anterior tibiæ yellowish ; apical margin of the first segment and the second segment, except apical margin, rufous. Length, 10 mm.

One specimen. Washington (State). A very distinct species.

DESCRIPTION OF A NEW ANTHOCHARIS.

BY W. G. WRIGHT, SAN BERNARDINO, CAL.

A. Flora, n. sp.

♂, expanse 1.40–1.75. White. Forewings blackish at base ; many black scales along costa ; bar broad, at costa reaching inwards, and at the middle with an angle outwards into the orange, with a broadening, vaguely-edged stripe connecting it to the margin near inner angle ; orange patch very large, deep reddish coloured, the colour extending to costa and also to outer margin near the angle ; apical margin black with obtuse serrations inside, the lower end becoming maculate or merely of roundish spots in the edge of the orange patch ; fringe white and black.

Secondaries white, seldom faintly tinged with yellow ; base blackish ; eight or nine relatively large black spots at end of nervules ; fringe white with a few black filaments at the venules.

Under side : bar separated by a deep sinus on the outer side into two ovoid spots ; the orange paler, followed by faint pink, then by pale blue ground, with blackish spots along nervures. Secondaries : veins yellow ; a dense marbling of black relieved by scattered yellow scales ; the pattern of marginal marbling is of even-sized spots along the venules, with narrow interspaces white.

♀, expanse 1.40–1.70. Yellow ; orange patch much smaller and a little paler than in the ♂ ; a yellow sexual stripe, sometimes maculate, next to the orange and scarcely separated from it by indefinite cloudy spots ; the apical margin becoming but a series of connected blackish points projecting sharply into the yellow. Hindwings yellow, with marginal spots as in the ♂.

Under side : similar to the ♂, but more deeply yellow.

Habitat, Western Washington.

Described from 55 ♂, 21 ♀.

This is the most northern of the orange tipped group of Anthocharis. It is found from the Willamette Valley in Oregon to Vancouver in British Columbia, and from the Pacific Ocean to the Eastern slopes and spurs of the Cascade Range of mountains in Central Washington, but in Eastern Washington and Idaho it is replaced by *A. stella*. Its metropolis is in the densely fir-forested country west of the Cascades, and about Puget Sound, where it is fairly abundant. The ♂ is a little larger than *A. reakertii*, and with broader wings and more pronounced black markings; and the marginal marbling in even blocks along the venules is distinct. The ♀ is deep lemon yellow, the colour being even and uniform rather than discal. This species is also rather peculiar in that the ♀ is of smaller average expanse than the ♂.

CORRESPONDENCE.

CATOCALA AMICA, HUBN.

Dear Sir: I notice that Mr. Hulst refers *lineella* as a synonym of this species. It is not a synonym, but a well marked variety, constantly recurring with the typical form. I remember that my earlier opinion that it might be a distinct species was shared by W. H. Edwards, as well as other lepidopterists. On the other hand Mr. Hy. Edwards's *herissa*, referred by me as a variety, Check List, p. 40, is a suffused Southern form of *Amica*, no two specimens being exactly alike (as is the case with *lineella)*, and giving one the impression as if the species had run out in Texas. I do not know if it is found in Mexico. *Lineella* must be restored as a perfectly recognizable variety of *Amica*. I embrace this occasion to repeat my opinion that *Alabamæ* is a valid species, as also to protest against the identification of *fratercula*, G. & R., with *micronympha*, Guen. I believe also that when *residua* and *Meskei* come to be bred, their specific validity will abundantly appear. I have had to rescue *praeclara*, *dulciala*, *crataegi*, and other species from Mr. Hulst's errors in cabinet opinion. It is not necessary for me to lose one word over Mr. Hulst's rejection of *Euparthenos* and *Audrewsia* as valid genera.

Very respectfully,

A. R. GROTE.

A CORRECTION.

Dear Sir: In my paper on "New North American Homoptera," in the May number of the CANADIAN ENTOMOLOGIST, on page 115 occurs a typographical error that calls for a prompt correction. The name *Athysanus obtusus* there applied to a species described as new should have read OBTUTUS. The name *obtusus* was long ago preoccupied for a well-known European species in this large genus. The similarity of these names is only in their form, and need not be confusing.

Buffalo, N. Y., April 29th, 1892. EDWARD P. VAN DUZEE.

BOOK NOTICE.

SPECIAL REPORT OF THE STATE BOARD OF AGRICULTURE on the work of Extermination of the Ocneria Dispar, or Gypsy Moth. Boston: Wright & Potter Printing Co., 1892.

This official pamphlet gives an interesting account of the very remarkable and unique efforts that are being made in the State of Massachusetts to exterminate the Gypsy Moth. This insect, imported from Europe, was accidentally permitted to establish itself about twenty years ago, and has now multiplied to such an extent as to be a very serious pest throughout a considerable area of the State. In March, 1890, the Legislature passed an Act appointing three commissioners to "provide and carry into execution all possible and reasonable measures to prevent the spreading and secure the extermination of the *Ocneri dispar* or Gypsy Moth in the commonwealth". The sum of $25,000 was also appropriated for the work. Last year the commission was merged into the State Board of Agriculture, and a further grant of $50,000 was made to it. The report before us gives the details of the work carried out and the modes adopted for waging war against the insect. They were very largely under the direction of Prof. Fernald, as Entomological Adviser, and Mr. Forbush as Superintendent of field work. The number of men employed varied with the season, and at one time, in June last, was as many as 242. The work began with the destruction of the eggs; when these proceeded to hatch out, spraying the caterpillars with insecticides was adopted, and towards the close of the season the eggs were again made the objects of attack. An enormous number of the insects were thus destroyed and a perceptible diminution in the amount of injury was observed in some places. We shall look forward with great interest to the results of the present year's operations, and hope in time to be able to record a great victory in this field of practical entomology.

Mailed May 30th.

The Canadian Entomologist.

VOL. XXIV. LONDON, JULY, 1892. No. 7.

NOTES ON COLEOPTERA—NO. 10

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Platynus reflexus, Lec., and variety *a.*—This species may be found in some abundance when sought for in its natural habitat: under stones in the bed of nearly dry hill-side streams and the debris along their banks, June being the time of its greatest abundance. In Dr. Leconte's synopsis of *Platynus* (Bull. Brook. Ent. Soc., II.,) a variety is noted as *a*, with four elytral punctures, while *reflexus* has but three—nothing further being stated. This form occurs here, not as an individual variation, but at least as a race, perhaps a species. It is more elongate, narrower and smaller than *reflexus*, the latter being from .44 to .48 inch. in length, while the variety *a* is from .35 to .38 inch.; the head is narrower and longer behind the eyes, and a little longer than the thorax; the thorax is narrower, less rounded on the sides, more gradually narrowed to base and about as long as wide; the base of the elytra is less emarginate, and the humeral angles more obtuse; the general colour is much less piceous. These comparative differences, it will be seen, enable these forms to be separated at sight. The anterior three elytral punctures are usually placed at uniform distances, either in the third stria or on the external side of the third interval, though the third is occasionally placed on the internal side of this interval; the fourth puncture is situated in the second stria about one-fifth from apex—sometimes on inner side of the third stria. There are now before me twelve examples of *reflexus* and twenty of var. *a*. While *reflexus* is liable to turn up in any spring run during the summer, I know of only one locality for var. *a*—that from which the above examples were taken May 4th. This is in the bed of a spring run which is dry all summer except during a rain. Whether this form occurs elsewhere is unknown, and it is probable the examples seen by Dr. Leconte came from here.

Liparocephalus brevipennis, Mæk., Bull. Mosc., 1853, 192.—The examples on which this species as well as genus were founded were taken on the coast of the Island of Chtagaluk, under sea drift. When Dr. Leconte reviewed the genus (Tr. Am. Ent. Soc., VIII., 177,) there was before him a small male example from Unalaschka, also a male from the coast of Mendocino, Northern California ; and on the latter a species was erected, the two forms being separated thus :—

" Head not wider than the prothorax, which is feebly narrowed behind, and not sinuate on the sides ; basal angles obtuse, rounded, length 2.7 mm. [that of type 2 lin=, 1775 *inch.*]—*brevipennis.*"

" Head wider than the prothorax, which is strongly narrowed behind, with the sides subsinuate near the base ; basal angles rectangular, very slightly rounded ; 3.6 mm.—*cordicollis.*"

There are before me 3 ♂ and 2 ♀ examples of *brevipennis* ; one of the males has the head scarcely as wide as the thorax, another subequal to and a third greatly wider ; in this example the thorax is narrowed to two-thirds at base, with the angles somewhat rectangular ; in the others as well as in the females it is more or less narrowed, with the basal angles varying from obtuse to strongly rounded. The females have the head and thorax subequal and the last ventral segment rounded. In both sexes the dorsum of the thorax is widely arcuate, and more or less deeply concave from the base to the middle. The characters relied upon by Dr. Leconte to establish his species seem to be inherent also in Mæklin's. These examples are from the Queen Charlotte Islands, the fauna of which, judging from the portion of it seen, or lately recorded, appears to be identical with that of the neighboring Alaskan Islands.

Dendrophagus glaber, Lec.—An example of this wide spread northern species occurred here in April of this year, and I saw another taken near the same time in Elk County, Pa.

Brontes dubius, Fab., *truncatus*, Mots., and *debilis*, Lec.—Mr. T. L. Casey (Tr. Am. Ent. Soc., XI., 99) says of *debilis* : " This is the common northern species, while *dubius* is more plentiful at the South." This remark, which is probably a clerical error, is occasioning trouble among a certain class of collectors who have Mr. Casey's paper. The fact seems to be the reverse. While *dubius* is excessively abundant here and northward, *debilis* has not occurred, neither is it on any of the northern catalogues, with one exception, which examples from its author show to be an error. I cite Leconte in Agaz. Lake Sup., No. 61 (Hamilton and Henshaw's Cat.); Harrington, No. 34 ; Brodie and White, No. 12 ;

Hubbard and Schwarz, No. 54; Reinecke (‡ *debilis)*, No. 107; Dury, No. 27,—all the Canada label lists. If Mr. Casey's statement cited is not an error, the localities of its northern distribution are not on record.

B. debilis was described from Georgia, with the remark: "not rare."

B. truncatus, Mots., from Alaska and California, is very easily separated from the other species, and, though catalogued as a variety, seems to be as good a species as *debilis*. The name *truncatus* is sometimes applied to certain individuals of *dubius* in which there is an evident sinuosity at the apex of the elytra, but this is different from that in the true *truncatus*, and other secondary characters are absent.

Rhopalophora longipes, Say, and *R. Meeskei*, Casey, (Ann. w. Y. Acad. Sci. VI., 30.—*R. longipes* occurs here occasionally in June; when found it is in abundance, and twenty-eight examples are before me. There are also before me from St. Fe Canon, N. M., seven examples of what Mr. Casey describes as *R. Meeskei*, but which can scarcely be considered more than a slight geographical variation of *longipes*. Although Mr. Casey states he had before him a good series of *longipes* from Indiana, it could not have been such a miscellaneous lot as is before me or he would scarcely have written the conspectus.

"Prothorax narrow, truncate at base, not impressed dorsally.—*longipes*."

"Prothorax broader, feebly biimpressed dorsally, broadly, strongly emarginate at base; form more robust.—*Meeskei*.

The twenty-eight examples before me exhibit great instability in length, breadth and sculpture of the thorax; in some of the ♂ ♂ it is fully one-third longer than wide, and in others, both ♂ and ♀, subequal; in the majority of individuals of both sexes however it is evidently longer. As to sculpture, all the individuals have a wide constriction at apex occupying about one-third of the length of the thorax, and more or less evident, which is sometimes interrupted at middle by a dorsal subcarina; the transverse basal impression is narrow, and in all there is an obtuse tubercle on each side behind the middle more or less prominent. Some individuals have a carina between these tubercles extending from near the base to the apical constriction, often continued forward obtusely; on each side of this carina is a broad oblique impression which connects behind the carina with the other and the transverse basal; the tubercles mentioned are situate behind this discal impression and appear more or less elevated according to its depth; the punctuation becomes coarser as the sculpture of the thorax becomes deeper; the lines of pubescence are too variable to be considered, and the truncation, or emargination of the base of the thorax in a large series is evanescent.

In a systematic point of view the separation of these forms into species seems inadmissible. Remove the locality labels from a mixed lot, sufficiently numerical, and how all could be replaced again with certainty is not evident.

Psenocerus supernotatus, Say, and *P. tristis*, Casey.—This last seems to be the black form of *supernotatus* mentioned (CAN. ENT., XVIII., 113) as found on wild gooseberry *(Ribes Cynosbati).* In comparing the only example of this form left with Mr. Casey's description (l. c. 46) it seems to apply very fairly; the elytral basal tumidity is, perhaps, a little more pronounced, but this can scarcely be considered essential, as this is quite obsolescent occasionally in examples of *supernotatus*. I once supposed this might be a species, but a study of the variableness of *supernotatus* in connection with the colour changes in *Clytanthus albofasciatus*, *Cyrtophorus verrucosus*, etc., led to a different result.

Sphænothecus suturalis, Lec., and *rubens*, Casey (l. c. 34).—The latter is a form which has been distributed as a variety of *S. suturalis*, being identical in form, size and colour, and chiefly differing by the nature of the thoracic and elytral punctuation. The few examples seen do not connect by intermediate forms, though in a large series, judging from what occurs in some other Cerambycidæ, as *Leptura canadensis*, such may exist. They are easily separable, the most reliable method being to observe the difference of the elytral punctuation. Whether systematists may regard this form as varietal, racial, or truly specific, collectors hereafter can give it a name. My examples are labelled "El Paso, Tex."—*Casey*, Southern Arizona and California. *Suturalis* was described from the Staked Plains, now probably in Lincoln Co., N. M. My examples, Deming, N. M.—*Casey*, Tucson, Arizona.

Leptura serpentina, Casey (l. c. 41), greatly resembles *3-balteata*, Lec., but examples from Idaho exhibit it clearly a valid species, which is readily separable by its rufous antennæ.

Orsodachna atra, Ahrens.—This species has always been perplexing to inexperienced collectors; no other on the list presents more variety in size, sculpture and ornamentation. It varies from .13 to .30 inch in length; the sculpture of the thorax and elytra may be rough and with coarse punctures, or smooth and finely punctate; the colour varies from entirely piceous black to entirely yellow through all modifications of these colours, the elytra may be vittate, maculate, or unicolorous. A recent study by Dr. George H. Horn gives the first intelligent account of the species as a whole. He mentions six varieties by name separated for convenience by colour characters, though others are not wanting, and there may possibly be two others entitled as validly to the same rank. It is distributed generally from the Atlantic to the Pacific and far northward. Here the species appears in April on wild plum, and later on pear and apple blossoms where the trees are near a wood or forest. Two varieties occur together at this time, neither of which seems to be as mature as the individuals taken later in the season. One of these is the pale or dusky form of *atra*, which is assumed to be the entirely black form with a rough uneven thorax, often with some small, smooth facets. This form is taken sparingly by bush beating as late as August; it is usually coarsely sculptured, and one large example has three evident costal lines on the elytra; all the spring brood of whatever colour with the uneven rough thorax are referred to this variety. The other is the typical *hepatica*, Say, " head black, thorax rufous, elytra brownish." This is as abundant as the brown form of *atra*, and can best be separated from it by the comparative evenness and smoothness of the thorax; later, by beating, an apparently maturer form is taken with the elytra piceous black and the thorax orange-red, named by Newman *ruficollis;* without care this form may be readily overlooked in collecting, from its resemblance to *Corphyra terminalis* with which it frequently occurs. No black example of this variety have been observed.

Of the var. *vittata*, Say, few examples have been seen; the thorax is rougher than in *hepatica*, but less so than in *atra*, is shorter than in either, and entirely rufous; the elytra are piceous with a narrow dorsal stripe, yellow.

The var. *armeniacæ*, Germ., is not common; in it the thorax is entirely piceous black, as rough as in *atra* and more convex, narrower to base and apparently more elongate; the elytra are narrow, piceous, with a uniform moderately wide dorsal vitta yellow. Length, .26 inch. This is a fine variety; none of the others mentioned by Dr. Horn have occurred here.

Of var. *childreni* many examples have been seen from New Mexico, Colorado and Vancouver Island; in general it is less coarsely punctured than the forms mentioned; the colour is perhaps more variable, there being pale, piceous and vittate forms; from Vancouver I have two examples, one entirely luteous yellow, the other piceous black. An example from New Mexico differs greatly from any of the varieties mentioned by Dr. Horn. The surface of the thorax is entirely smooth, even, polished and shining; convex, sparsely and finely punctured; the elytra are also smooth and shining with a fine but sparse punctuation; the antennæ are ferruginous, and the legs variegated with pale and fuscous. General colour of the insect chocolate-brown. Length, .29 inch. Set beside the *atra* of the same size with semi-costate elytra, it is difficult to believe them to belong to the same species.

Zeugophora consanguinea, Cr.—This is a form of *varians* in which the thorax is entirely rufous. In collecting *varians*, perhaps one example in twenty will be so coloured. I do not know of its occurrence except with *varians*.

Bruchus obsoletus, Say, *B. rufimanus*, Bohm., *B. lentis*, Bohm.—The American history of these unwelcome foreigners has been presented in a very masterly and satisfactory manner by Mr. J. A. Lintner (Seventh Rep. on the Injurious and other Insects of the State of N. Y., 1891). *B. rufimanus*, it appears, is not known to be naturalized, though bred twice, or oftener from peapods or beans brought from Europe, and is the *B. granarius* of Mr. Fletcher's Report (1888). *B. lentis* occurred at Buffalo, N. Y., in a provision store where imported lentils were kept on sale, and was distributed to cabinets under the name of *B. rufimanus*, but did not acclimate. *B. obsoletus*, Say, is discussed in twenty-five pages. It was first discovered at Providence, R. I., in 1860. The beans supplied to the soldiers of the armies during the war of the Rebellion were largely infested with it. It spread slowly westward to and beyond the Mississippi and northward but is not known to have entered Canada so far, Mr. Lintner. *B. obsoletus* was prevalent here several years ago, but has entirely disappeared, none having been observed by cultivators in its old haunts for about five years. No means of extermination, nor to prevent its spread, were employed. It is certainly extinct here. That it may likewise become extinct from climatic causes, at least in the Northern States, is far from improbable. According to Mr. A. Fauvel this *Bruchus* is of Neotropical origin and native in Central and South America. This clearly accounts for its non-acclimatization in Canada, and holds out a hope of its eventual extinction here. Through favouring conditions it was spread very widely, but except in a few localities it is now scarcely known. Some climatic condition may likely make it a thing of the past. How, whence, and when it was introduced along the Atlantic sea coast is unknown; it could scarcely have been from Europe, as it is little known there where it is a very recent importation. If the "buggy" beans fed to the soldiers in the North and South during the war of the Rebellion were raised in these respective regions, it is evident the insect must have been widely spread previously to 1860; if beans were imported in large quantity, it would shed much light, were the countries known from which they had been brought. It is quite probable the present invasion is not the first visit this insect has made to North America, but on any former occasion it could not have met with so good entertainment. Through commercial intercourse with southern countries it probably reached Louisiana during the first part of the present century, and was transported northward as far at least as the State of Indiana, where Say found it. Whether the insect described by Say was the same species which depredates on beans is sometimes questioned, because the examples from which he made the description were obtained from the seeds of a something he terms *Astragalus*. His description is, however, so applicable in many points to the bean *Bruchus* that had he written "obtained from beans," the question would likely never have been raised. Besides it is neither food habits nor locality which constitutes a species. What Say meant by an *Astragalus* is uncertain, probably the *Wistaria frutescens*, as none of the species of the genus *Astragalus* as now constituted, which grows in that part of Indiana has seeds sufficiently large to breed the insect. Much more might be said. Suffice it to say that if the examples Say described belonged to the foreign species, that species existed there only temporarily, and long ago disappeared, as it has certainly lately done from this locality. If it is a native species, then it is almost certainly in existence in that part of Indiana, depredating as in Say's time on *Astragalus*, whatever that may be. To reject Say's name before a species of *Bruchus* shall have been found in Indiana raised from some native Siliquose plant or tree to which his description shall apply as well or better, would seem, to say the least, an arbitrary and unnecessary proceeding.

This species is now widely distributed through the warm countries of the globe: Central and South America, West India Islands, Madeira, the Canaries, the Azores, the countries of Europe, Africa and Asia bordering the Mediterranean, Persia, etc.

A NEW SPECIES OF EUDAMUS.

BY HENRY SKINNER, M. D., PHILADELPHIA, PA.

Eudamus coyote: Expands 2⅛ inches. Primaries dark glossy brown, several shades darker than *Eudam. bathyllus*; fringes of same colour as the wings. The apices of the wings run more to a point than in other species of the genus. There are no markings on the primaries, although there are some very faint indications of markings, which are not brought out by transmitted light. Secondaries immaculate and same colour as primaries, but with well marked dirty white fringes. The secondaries are not tailed but are somewhat pointed as in *E. epigena*. Underside: Primaries lighter in colour than above with some light coloured scales along the costa which faintly indicate a spot about the middle of costal margin; directly below this in the cell is another very faint spot. There are three dark spots between the subcostal nervules, extending downward in a row and about an ⅛ inch from the exterior margin, the upper spot not being in an exact line with the two lower ones; just below these, but further from the margin are three others in the spaces between the discoidal nervules. These spots are lighter coloured in the centre and the central spot of the three is not in line with the other two but nearer the body of the specimen. These spots are not very well defined and vary somewhat in the individuals. Fringes same colour as wings. Inferiors are crossed by two bands of darker colour which are about ⅛th in. in width and they extend from costal margin almost to the inner margin; the upper band is broken by having one of its spots in the cell and above this in the cell is another dark spot. The fringes are white as above and the white terminates at junction of exterior and inner margins; fringes on inner margin are very dark, almost black, as is also the point of the wing and adjacent parts. Body, head, legs, etc., dark brown; palpi distinctly gray; there is a gray white line made up of short hairs, extending around the under side of the eyes. Described from five specimens from Southern Texas in collection of author. The specimens are not in very good condition and the description is taken from the most perfect one.

NOTES ON NORTH AMERICAN TACHINIDÆ, WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.—PAPER VI.*

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

This paper contains descriptions entirely of Southern New Mexican forms, with the exception of two from the State of Chihuahua, Mexico.

Sarcomacronychia sarcophagoides, n. sp. ♀.

Eyes brown; frontal vitta narrow, blackish, front one-fourth width of head; sides of front, face and cheeks silvery-white; the double rows of frontal bristles nearly equal; vibrissæ distinct, short, decussate, inserted well above oral margin; antennæ and arista blackish, second antennal joint slightly rufous at ends, third one and a-half times as long as second; proboscis black, labella brown; palpi slender, brown; occiput cinereous, short black-bristly. Thorax, scutellum and abdomen cinereous, more or less faintly brassy, with three blackish vittæ, the middle one continued over scutellum and abdomen, the lateral ones more or less distinct on sides of scutellum and more broadly and irregularly continued on sides of abdomen to anal segment, the abdomen more distinctly brassy or golden, anal segment wholly rufous, deep golden pollinose at base, hind margin of third rufous; humeri and pleuræ silvery-whitish; second segment with a pair of median marginal macrochaetæ, third with a marginal row of twelve or more, anal with about four marginal. Legs black, femora silvery on outside, claws and pulvilli a little elongate, pulvilli whitish. Wings hyaline, veins more or less brownish, tegulæ white; halteres rufous, knobs yellowish.

Length of body, 7½ mm.; of wing, 5 mm.

Described from one specimen; Las Cruces, New Mexico. June 9. This species bears a striking superficial resemblance to one of the smaller *Sarcophagidæ*.

Brachycoma chihuahuensis, n. sp. ♂.

Eyes brown; frontal vitta dark brown; front about one-third width of head, frontal bristles in a single row descending to base of third

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* Paper I. was published in Proc. Ent. Soc., Wash., II.; papers II. and III. in Trans. Am. Ent. Soc., XVIII. and XIX.; paper IV. in Ent. News, III.; paper V. in Can. Ent., XXIV.

antennal joint, no orbital bristles; sides of front, sides of face and occipital orbital margins silvery-white; facial depression and cheeks silvery-gray; cheeks pubescent, facial ridges bare save some weak depressed bristles above vibrissæ; antennæ entirely light rufous, arista brown, third antennal joint hardly twice as long as second, quite peg-shaped; proboscis fleshy, shorter than height of head, blackish, palpi pale rufous; occiput cinereous, gray-hairy. Thorax cinereous, with five black vittæ, the middle one arising at suture, the outer ones rather heavier than the inner pair; scutellum rather silvery, testaceous or tawny at apex. Abdomen shining black, anal segment rather dark rufous, whole abdomen faintly cinereous pollinose. Legs black, claws and pulvilli elongate, pulvilli fuscous. Wings grayish-hyaline, veins tawny; tegulæ white, halteres tawny.

Length of body, fully 8 mm.; of wing, 6 mm.

Described from one specimen; Chihuahua, Mexico. Mex. Cen. R. R., August 4. This specimen apparently shows a very faint rufous tinge on sides of abdomen.

Hypertrophocera parvipes, Twns. Trans. Am. Ent. Soc., XVIII. A specimen taken June 26, Las Cruces, N. M., was damaged by moisture. It shows scutellum and abdomen wholly rufous, except a heavy median black vitta on latter. It measures 6½ mm.

EUCNEPHALIA, n. gen.

Facies of *Cnephalia*, with head (except arista) of *Gonia*. Belongs in *Phoroceratinæ*. Head rather quadrilateral in profile. Front (♀) one-half width of head, narrower at vertex, face a little wider; frontal bristles in two rows, descending about to base of third antennal joint, with smaller bristles among them which are continued in broken rows on the wide sides of face and cheeks, as in *Cnephalia*; two orbital bristles (♀). Face nearly perpendicular, epistoma prominent; facial depression a little more than one-third width of face, shallow; facial ridges with bristles more than half way up, constricted considerably above oral margin where the short decussate vibrissæ are inserted; sides of face very wide, cheeks nearly two-thirds eye-height. Eyes bare. Antennæ inserted above median line of the eyes, shorter than face, second joint slightly elongate, third about three times as long as second; arista shorter than third antennal joint, thickened its whole length, bare, 3-jointed, second joint elongate. Proboscis shorter than height of head, rather stout but not fleshy, labella present; palpi long, rather slender, thickened and curved at tip. Thorax and abdomen not quite as wide as head; scutellum with a strong sub-apical and two strong lateral pairs of macrochaetæ, and a shorter discal pair. Abdomen elongate oval, not flattened, first segment a little shortened; macrochaetæ only marginal. Legs moderately long, femora rather stout and bristly, middle and hind tibiæ spiny; claws and pulvilli of ♀ a little elongate. Wings longer than abdomen, without costal spine, third vein bristly at base; apical cell open, terminating before tip of wing; fourth vein bent at obtuse angle, with a wide, shallow wrinkle at bend appearing as a slight cloud, apical cross-vein a little concave; posterior cross vein curved or sinuate, nearer to bend of fourth. Type *E. gonoides*, n. sp.

This genus differs from *Cnephalia* in the character of the antennæ and arista, and in the facial ridges being bristly. It differs from *Frontina* in having the sides of face bristly, as in *Cnephalia* and *Gonia*.

Eucnephalia gonoides, n. sp. ♀.

Eyes light brown; frontal vitta brownish; sides of front, face and cheeks silvery white; antennæ pale rufous, blackish on apical half more or less of third joint, arista black; proboscis blackish, palpi light rufous; occiput silvery, rather thickly clothed with yellowish gray hair. Thorax silvery pollinose, with five narrow black vittæ, the middle one obsolete in front, the inner pair obsolete a little behind suture, others reaching scutellum, eight rows of macrochaetæ on thorax; scutellum silvery pollinose, blackish at base, testaceous at tip. Abdomen black, reddish on sides of first to third segments, second to fourth segments silvery-white pollinose except the more or less narrow posterior margins; first two segments with one lateral macrochaeta and a median marginal pair; third with a marginal row of ten or twelve; anal segment with a marginal row of eight or ten; venter reddish, with median vitta and anus blackish. Legs black, femora silvery below, tibiæ with spiny macrochaetæ except front ones, claws and pulvilli only a little elongate, pulvilli yellowish fuscous. Wings grayish, tegulæ white, halteres brownish.

Length of body, 9⅔ mm.; of wing, 7½ mm.

Described from one specimen; Dona Ana County, New Mexico. Apache Canon. Oct. 18.

Rhinophora valida, n. sp. ♂.

Eyes brown; frontal vitta light rufous, front narrowed before ocelli to about one-fifth width of head; sides of front, and face silvery-white; cheeks long and wide, compressed, silvery cinereous behind, pale rufous anteriorly, the under side of head below eyes having a singularly narrowed and elongate apperance in front view; antennæ and arista black, first two antennal joints and base of third light rufous, arista long pubescent; proboscis blackish, labella light brownish, palpi pale yellowish rufous; occiput silvery cinereous. Thorax and scutellum silvery cinereous. Abdomen black, silvery cinereous, hind margins of segments usually blackish; second segment with a median marginal pair of macrochaetæ, third with a median discal pair, anal segment armed with discal and marginal macrochaetæ and bristles. Legs blackish, front femora slightly silvery cinereous, claws and pulvilli elongate, pulvilli tawny fuscous. Wings grayish-hyaline; veins blackish, especially cross-veins; apical cross-vein sinuate, fourth vein bent at an angle with slight stump at bend, hind cross-vein very near to small cross-vein; tegulæ nearly white, halteres yellow.

Length of body, 4 mm.; of wing, nearly 3½ mm.

Described from one specimen; Las Cruces, New Mexico. San Andreas Mts. August 21.

Rhinophora mexicana, n. sp., ♂.

Eyes light brown or dark brown; frontal vitta deep blood-rufous, front about two-ninths width of head behind, wider in front, face widening at about same angle: sides of front, sides of face and facial depression silvery-white, more or less golden on front, the sides of face with some bristles which are longest below, frontal bristles not descending below antennæ, no orbital bristles; cheeks nearly all comprised in the rufous-brown pregenal area, which is always bare; antennæ short, pale rufous or yellow, the third joint almost wholly or only at tip blackish, little longer than second; arista blackish, pubescent; proboscis brownish, about as long as height of head, palpi small, yellow; occiput cinereous, somewhat brassy or golden, black-bristly. Thorax and scutellum silvery-gray pollinose, more or less golden, with four darker vittæ interrupted at suture. Abdomen silvery-gray pollinose, more or less distinctly golden, first segment blackish at base; first segment with a lateral mocrochaeta and bristles; second with a lateral marginal pair, usually a weaker lateral discal one or two, and a median marginal pair; third with several lateral discal ones and a more or less complete marginal row; anal segment with a more or less regular discal and marginal row. Legs black, femora more or less silvery, tibiæ bristly, claws and pulvilli elongate, latter smoky tawny. Wings grayish-hyaline, transverse and fourth veins black, other veins more or less tawny ; tegulæ nearly white, halteres light rufous.

♀.—A specimen which I take to be the female of this species differs in having no golden shade, except very faintly on scutum ; the front is hardly one-fourth width of head, and there are no orbital bristles. Macrochaetæ hardly as thick ; claws and pulvilli scarcely shorter.

Length of body, ♂, 5 to 6⅓ mm.; ♀, 6⅓ mm.; of wing, ♂, 4½ to 5½ mm.; ♀, 5½ mm.

Described from six males and one female ; Las Cruces, N. Mex. June 3.

Leucostoma neomexicana, n. sp. ♂.

Eyes brown ; frontal vitta velvety black ; sides of front, face and cheeks silvery-white, the sides of front shading to dark, epistoma whitish ; antennæ and arista black, the third antennal joint no longer than second ; proboscis about as long as height of head, blackish, labella brownish ; palpi rufous yellow ; occiput black, black-hairy. Thorax and scutellum dark bluish-black, shining. Abdomen shining black, last two segments thinly silvery pollinose ; first segment with a lateral pair and a median marginal pair of macrochaetæ, other segments with a marginal row ; whole abdomen clothed with long macrochaeta-like bristles, making the real macrochaetæ difficult to distinguish, whence the first segment might almost be said to have a marginal row. Legs black, claws and pulvilli elongate, pulvilli silvery. Wings almost hyaline, veins tawny at base ; tegulæ very large, pure white ; halteres blackish.

Length of body, 4½ mm. ; of wing, nearly 4 mm.

Described from one specimen ; Las Cruces, New Mexico. June 29. This species has the third antennal joint no longer than the second, and is therefore distinct from the species described by v. d. Wulp and doubtfully identified by him as *L. analis*, Meig. (Biol. C.-A. Dipt. II.). His species is perhaps a *Leucostoma*, but the second species, *L. gravipes*, v. d. W., is probably a *Phyto*. *Leucostoma* should be restricted to the smaller species with unusually large tegulæ.

Phyto nigricornis, n. sp. ♂.

Eyes very dark brown; frontal vitta soft black, sides of front shining black, more or less silvery, the front about one-third width of head in middle; face and cheeks black, thinly silvery pollinose, the cheeks black hairy and with brownish pregenal area; frontal bristles rather thick and strong, no orbital bristles; vibrissæ inserted considerably above oral margin, strong, decussate; antennæ and arista black, second antennal joint brownish, third joint no longer than second; proboscis black, labella brownish, palpi light rufous; occiput black, more or less silvery or cinereous, black-hairy. Thorax shining black, very faintly, almost imperceptibly, grayish pollinose; scutellum black. Abdomen shining black, first segment faintly, others more distinctly, yet thinly, silvery or grayish pollinose; first segment with two or three lateral macrochaetæ and four median marginal ones, segments two to four with a marginal row; hypopygium more or less exserted. Legs black, rather stout, claws and pulvilli elongate; claws blackish, pulvilli smoky-whitish, black at base. Wings grayish-hyaline, slightly tawny at base, veins brownish; tegulæ whitish, shining, borders narrowly tawny; halteres rufous, knobs blackish.

♀.—Front about one-third width of head but nearly equilateral, while in the ♂ it is much wider before than at vertex; two orbital bristles. Abdomen terminated by a forceps, the whole abdomen shining black, not pollinose; the macrochaetæ weaker, and second segment with same number as first. Claws and pulvilli much shorter, yet somewhat elongate.

Length of body, ♂, 5 to 6 mm.; ♀, 4½ mm.; of wing, ♂, 4 to 5 mm.; ♀, 3½ mm.

Described from seven males and one female; Las Cruces, New Mexico. One male taken Sept. 20, all the others Oct. 25.

MUSCOPTERYX, n. gen.

Belongs in *Phytoinæ*. Head more or less rounded in profile. Front of ♂ averaging about one-third width of head, gradually widening from vertex forward, face widened at same angle; frontal bristles in single row, descending on sides of face not quite to lower border of eyes, those on front stronger, vertical bristles strongest and, with next pair, directed backward, others more or less forward, inward, decussate; two orbital bristles in ♂. Face somewhat receding, epistoma not prominent; facial depression about one-half width of face, shallow; facial ridges bare except a bristle or two next vibrissæ, latter rather strong, decussate, inserted at a very slight constriction of the ridges a little above oral margin; sides of face of moderate width, bare except for frontal bristles; cheeks hardly one-fourth eye-height, bare except row of bristles on lower margin. Eyes thinly hairy. Antennæ short, hardly two-thirds length of face, second joint slightly elongate, third joint hardly as long as second, rounded; arista thickened on basal third, nearly bare, apparently two-jointed, basal joint short. Proboscis short, about two-thirds height of head, fleshy, part below geniculation hardly longer than that above, labella developed; palpi small, very slender, filiform, bristly. Thorax about as wide as head; scutellum with an apical decussate, and two lateral pairs of macrochaetæ. Abdomen narrower than thorax, ovo-conical, first segment not shortened; macrochaetæ marginal and discal, strong; hypopygium concealed. Legs moderately long and stout, bristly; claws and pulvilli of ♂ quite elongate. Wings longer than abdomen, with costal spine, third vein bristly at base; apical cell closed in border very little before tip of wing, fourth vein bent at angle without stump or wrinkle, apical cross-vein a little concave; hind cross-vein sinuate, nearer to bend of fourth vein. Type *M. chætosula*, n. sp.

Muscopteryx chaetosula, n. sp., ♂.

Eyes dark brown, blackish; frontal vitta brownish, silvery; sides of front, face and cheeks silvery-white, the pregenal area extensive, brownish, silvery; antennæ and arista blackish, first two antennal joints rufous; proboscis dark brownish, palpi pale tawny; occiput silvery, gray-hairy below. Thorax densely silvery-gray pollinose, with five rather indistinct cinereous vittæ, the middle one obsolete before suture, the outer ones interrupted at suture; scutellum, humeri and pleuræ silvery. Abdomen almost entirely silvery pollinose, the hind margins of segments darker, slightly brassy in some lights; first segment with a strong lateral macro-chaeta, besides other bristles and a median marginal pair; second with a lateral pair, a median marginal, and a weaker median discal pair; third with a weak median discal pair, and a marginal row of very strong macrochaetæ; anal segment with more or less irregularly placed marginal and discal ones. Legs black, femora silvery on outside, pulvilli whitish. Wings grayish-hyaline, tegulæ nearly white, halteres pale rufous.

Length of body, 6 mm.; of wing, 4½ mm.

Described from one specimen; Chihuahua, Mexico. Mex. Cen. R.R., August 4.

Vanderwulpia sequens, n. sp. ♂.

Eyes brown; frontal vitta dark brown; sides of front, face and cheeks silvery-white, the sides of front slightly brassy next vitta; two orbital bristles; antennæ blackish, slightly rufous at end of second joint, arista blackish; proboscis black, palpi black, rufous at extreme tip; occiput silvery-white, brassy above, gray-hairy. Thorax silvery-white, with two heavy deep black vittæ reaching scutellum, portion between vittæ more or less brassy; scutellum silvery, edged with black on sides continuing on sides of thorax posteriorly. Abdomen shining black; bases of segments two to four narrowly silvery-white pollinose, faintly so on basal half, first segment faintly silvery, anteriorly on sides and beneath; first two segments with one lateral macrochaeta and a median marginal pair; third with eight marginal, and anal with about as many marginal, which are not so strong. Legs black, femora silvery beneath, especially front pair; front coxæ long, silvery; middle and hind claws and pulvilli a little elongate, anterior ones minute. Wings golden fuscous on costal portions, grayish internally, more smoky towards apex, apical and hind cross-veins smoky; fourth vein with decided wrinkle at bend, apical cell extremely short petiolate; tegulæ white; halteres black, rufous at base.

Length of body, 8½ mm.; of wing, 6½ mm.

Described from one specimen; Las Cruces, New Mexico. August 26. This species differs from the type species of the genus *V. atrophopodoides*, Twns., in having the apical cell not moderately long petiolate, but closed immediately before margin. The arista is long pubescent, and this genus belongs in the *Dexiidæ;* although the genus *Atrophopoda*, so closely allied to it in the structure of the front feet, belongs by the character of the arista in the *Tachinidæ* s. str.

INSECTS ATTRACTED BY FRAGRANCE OR BRILLANCY OF FLOWERS FOR PURPOSES OF CROSS-FERTILIZATION.

BY RICHARD E. KUNZE, M. D., NEW YORK.

Nowhere in the flora or insect fauna do we see it better illustrated than by some of our *Argynnids* and *Asclepiadaceæ*. It must therefore be admitted that these Asclepiads are striking examples of entomophilous or insect-loving plants, and anyone in quest of insects will not be disappointed by dilgently studying the distribution of the Milk-weed family. Lepidoptera and hymenoptera visit these plants. Some flowers attract insects for the purpose of cross-fertilization, and these are either showy, brilliant in colour, or more or less fragrant. All other flowers are either wind-fertilized or self-fertilized. Insects resort to flowers for the purpose of obtaining honey—their food, secreted by the nectaries, or to take pollen found on the stamens of flowers; the former constitutes their staple of life and the latter furnishes wax to others for utilitarian purposes. Lepidoptera take food by suction and it must be of a liquid nature. Thus it will be seen that the relation of certain insects to flowers is really of absolute necessity.

Darwin's attention was early drawn to flowers of *Asclepias*, because the mass of pollen grains was borne on a foot-stalk, which had a sticky gland at the end of it, as found in Orchids. Modern geological research has demonstrated that lepidoptera first made their appearance during the *Tertiary* period, when true flowers began to be abundant. And so it is to this day. Bright-coloured and highly perfumed flowers are always associated with myriads of insects, of which butterflies and moths contribute a large number. This is the reason why some of the larger Argynnids, such as *A. idalia* and *A. cybele*, are found to the best of advantage on flowering Asclepiads. When the various species of *Asclepias* are in full bloom, the Argynnids mentioned and even *A. aphrodite* may be looked for in more or less abundance.

Red Clover blossoms are resorted to by Argynnids before the advent of Milk-weed flowers, but I have never observed them there in such numbers. Another drawback to collectors, for reasons well understood, is that he must visit the locality when the owner of it is at church or taking his meal! I have seen a few *A. cybele* as early as May, on the azure flowers of *Echium vulgare*, known as Blue-weed and Viper's Bugloss, a very prickly plant introduced from Europe, found on poor, sandy soil. Papilios as well as Argynnids visit all these plants, in company with many other insects. When Milk-weeds are past bloom these Argynnids visit *Cnicus pumilum* or low Pasture-thistle, and other species. Later on they betake themselves to the gardens, and visit the flowers of *Zinnia elegans* and *Verbenas.*

In the latitude of Long Island and Northern New Jersey the *Asclepiadaceæ* flower in the following order :—

First of all, *Asclepias cornuti*, Silk-weed or Common Milk-weed ; then comes *A. purpurascens*, or Purple Milk-weed ; next *A. tuberosa*, or Butterfly-weed ; and finally *A. incarnata*, the Flesh-colored Asclepias or Swamp Milk-weed. I have found that *A. purpurascens* and *A. incarnata* will attract more of Argynnids, Danaids, Hesperids, Macroglossids and Hymenoptera than the other plants mentioned, when two or more species are in bloom at one time. Of these, *A. tuberosa*, with its orange-colored flowers, can be farthest seen, but comparatively speaking it is not fragrant to our senses, or very faintly so. *A. purpurascens*, the most fragrant, is much visited by Argynnids and Pamphilas, and after that comes *A. incarnata*. The last is the more plentiful plant, and inhabits swamps and margins of streams.

It is not an uncommon sight to behold a corymb of either of these *Asclepiadaceæ* in the possession of two or three Argynnids, several Skippers and Hymenoptera at one and the same time. All but the Swamp Milk-weed affect a gravelly or poor sandy soil, and may be found along the roadside, on railroad embankments, in fallow fields or skirting sylvan paths. To obtain the sweets from the innermost recesses of the five-lobed corolla, the lepidopterous insect almost buries its head within the flower. Those with a very long proboscis keep a weather eye open, so to speak, to warn them of approaching danger. This nectar must exert an almost intoxicating effect on the insectiferous sense, else Argynnids would not suffer one to approach them so closely while extracting honey from the nectariferous glands. The flowers of *A. cornuti* have longer pedicels than any other species, and the umbels do not present so compact a head of flowers as in the other mentioned species This drooping of flowers may be of disadvantage to diurnals with long probosces, and is, I believe, a good reason why Argynnids prefer to explore the more upright-standing flowers of other Asclepiads. The flower of *A. cornuti*, or Milk-weed, is not brilliant, a greenish-white delicately tinted with purple, but emitting a powerful fragrance. Although the larva of Danais archippus feeds on the leaves of *A. cornuti*, yet the imago takes its food very seldom from this flower, when other species are conveniently near.

The flowers of *A. tuberosa* can be recognized at a long distance, and are readily singled out by Lepidoptera. Though almost devoid of perfume* it abounds in honey. This proves that both colour and fragrance of flowers draw heavily on the senses of Lepidopterous insects. Many Nymphalidæ also visit the flowers of Milk-weeds.

Even on a windy day numbers of Argynnids and other Nymphalids, Hesperids, etc., may be found on these Milk-weeds, but rarely in the open. Patches of or single plants must be searched for in sheltered, wooded regions of fen and forest. To illustrate, I will state that the day after that Jamesburg, N. J., 4th of July, entomological field meeting, I went up to Westchester County, N. Y., just north of the city line. I netted a few Argynnis cybele from isolated plants of *Purple Milk-weed*, found in a grass-covered lane of the forest. It was as windy, if not so noisy, a day as it had been in Jamesburg, and the flowers of the open field were devoid of insects. Emerging from the forest, I entered a bog well hedged in by tall shrubs and young trees, and suddenly came upon a patch of very tall *Asclepias purpurascens.* These grew in the midst of a clump of Black Alder, Bayberry, Tall Blueberry bushes and Blackberry briars. The flowers were from five to six feet above ground and partially hidden by shrubbery. In passing close by I started up a large number of frightened *A. cybele*, which kept me busy for some time afterward. To get at the flowers I had to cut away branches and briars, and before leaving took a dozen and a-half of fine *A. cybele*, one *A. idalia* and numbers of Hesperidæ. I could have obtained more, but it grew to be rather monotonous work and went home. This may seem rather "windy" for a day when the Zephyrs blew small guns. But anyone can do the same, if not better, by studying the physical geography of localities. It repays for all the trouble. In the Western Catskills one of my nephews takes *A. aphrodite*, *A. cybele* and *A. bellona* sometimes in numbers on a fragrant species of *Solidago* or Goldenrod.

In the autumn I examined many of the asclepiadaceous plants, where last summer I had secured most of my Argynnids and other diurnals visiting *Asclepias.* Those species bearing the largest number of fruit pods corresponded with the plants on which I observed the most lepidopterous insects. There were single stems of *Asclepias incarnata*, on the tops of which I counted fifty-two seed follicles, and some of its flower-heads had from six to twelve seed-pods thereon. On *Asclepias*

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* The sense of smell is very acute in insects, and they are attracted to nidorous flowers by a faint odour of the honey, which is imperceptible to mankind.

purpurascens I observed from one to five seed-pods on a plant stalk. But it was the exception to notice a plant of *Asclepias tuberosa* which bore any fruit at all, and perhaps only one on half a dozen flowering stems given off by a single root. The scarcity of silk pods on this species was indeed very noticeable. Plants of *Asclepias cornuti* are not very well covered with fruit. I examined a large number of plants late in October, 1891, and found only from one to four seed follicles on large plants. The flowers of this species of Milk-weed are drooping from the axils of very large leaves, and are more or less hidden by the latter.

Asclepias phytolaccoides, or Poke Milk-weed, another fragrant species with long-peduncled umbels of greenish-white and purplish colour, grows in most woods. Its nodding umbels and dependent flowers are of disadvantage to the visits of the larger diurnals. The plant is less abundant than other species referred to. It prefers dense copses and is visited more perhaps by nocturnals than diurnals. Height from 3–5 feet.

Asclepias quadrifolia, or four-leaved Milk-weed, known by its whorls of leaves, is met with in dry woods overlying limestone rock. It also has loose-flowered and long-stalked umbels, and is fragrant. Flowers, pale pink with a white crown. Height of plant 1–2 feet, our smallest species. In colour and the shape of its flower-heads, also drooping, it much resembles *A. cornuti*, our tallest of the Milk-weeds found on the roadside.

Asclepias curassavica, or Bastard Ipecac and Blood-weed, is a prominent landmark of the West Indian Islands. It is the gayest and commonest weed of Trinidad, and found also in So. Florida. Jamaican negroes call it Redhead. It has a scarlet corolla and yellow appendages; flowers borne erect on umbels; grows about three feet high. Nymphalids and Danaids, as well as Lycænids, frequent its flowers. Inasmuch as all these Milk-weeds can be classified under bee-food, they are much visited by insects.

Dr. J. E. Taylor, of Ipswich Museum, England, thinks that mostly all the white or light-yellow flowers are cross-fertilized by night flying moths. Not only can they be distinguished at a greater distance on account of their luminosity than those of more brilliant hues, but their sweet-smelling properties will be a guide to moths. A larger proportion of white flowers emit fragrance than that of any other colour. And he tries to substantiate his conclusions by the following statement: "If we could take a census of British wild flowers, we should probably find that the most numerous colours are in proportion to their *luminosity*, or the ease with which they can be seen from the greatest distance. There are about twenty-five times more species of British moths than butterflies, and they are of all sizes, so that in this respect they suit all magnitudes of white flowers." Koehler and Schubler long ago made the same observation regarding colour and odour of flowers.

I think that in the case of the *Asclepiadaceæ* this holds good, because those preponderating in whitish or yellow flowers are less visited by diurnals than the red and purple-coloured species. I must mention here another curious circumstance relating to the aversion that Argynnids and diurnals exhibit toward *white* Zinnias, and Verbenas of the same colour.

In August or September of each year I look for Argynnids on these plants, when Milk-weeds are past bloom. In the season of 1890 I made numerous trips to a horticultural garden, where Zinnias, Verbenas and other plants were cultivated by the acre. There were beds of Zinnias, seventy-five feet long by twenty in width, of separate and mixed colours; five large beds, three of separate and two of mixed colours, all starting from a summer-house to the points of the asterisk, on a lawn 4–5 acres in extent, could be readily observed from the centre of this floral star. One bed contained fulvous-tinted Zinnias, another white, the next crimson, and two beds were planted with Zinnias of mixed colours, all but white. I have repeatedly watched these gorgeous flower-beds from 10 a.m. until 5 p.m., in warm, calm and clear weather, with the following result:

To the bed of *white* Zinnias only Pieris and a few Colias made their visitation, and but on a single occasion have I observed any other diurnal on these white flowers, and it was a single specimen of Papilio turnus. The two beds of fulvous and crimson Zinnias attracted many of the Argynnids, three of the large species, different Pyrameis, many Papilios, L. disippus, some Hesperidæ and day-flying moths. The other two beds of Zinnias, made up of mixed colours, in addition to lepidoptera mentioned, also attracted Colias and Pieris (a few) to their sulphur-coloured flowers, four species of Papilios and a few Euptoieta Claudia.

Zinnias are inodorous to our sense of smell, but the honey they contain and the fiery colours of their flowers are very attractive to lepidopterous insects. In the case of Zinnias and Verbenas, another brilliantly flowering and nidorous plant, it would seem that the gorgeousness of blossom serves the purpose of attracting diurnals for purposes of cross-fertilization. Plots of Verbenas, an acre and more in extent, I have watched with similar result. One man had more than two acres planted with only *white* Verbenas, and it was in possession of Pieris rapæ principally. The other contained all known colours, including a few white, and the plants were freely visited by Argynnis, Papilios and a number of other diurnals, as well as by Hemaris thysbe. The last mentioned appeared a little before twilight, about seven o'clock.

NEW NORTH AMERICAN MICROLEPIDOPTERA.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Pyrausta nigralis, n. sp.

Expanse of wings, 18 mm. The entire body and wings above and beneath, black; pectus and base of the palpi, snow white. The outer line is represented by a nearly straight, snow white stripe, which starts from the outer third of the costa and extends nearly half way across the wing and a spot on the fold near the outer third of the hinder margin below a similar spot on the end of the cell. There is also a white spot in the fringe below the apex and one at the anal angle, and the costal cilia are snow white. The hind wings have a small white spot at the base, another a little beyond the cell and an oblique stripe extending up from the anal angle. All these white spots and stripes are reproduced on the under side.

Described from three examples:—One in the collection of the National Museum, collected by Boll in Texas; one in the collection of Rev. Geo. D. Hulst, and one in my own collection. The last two were taken in March at Cold Harbor, Fla.

Teras angusana, n. sp.

Expanse of wings, 17 mm. Head, palpi and thorax, pale reddish-white. Fore wings, pale red with a somewhat darker red stripe extending from the middle of the base to the apex and edged with white on each side, but more prominently on the hinder side. An inconspicuous elongate spot of a leaden blue colour rests on the middle third of the hinder margin. Fringes, concolorous. Hind wings and abdomen above, silky gray, lighter beneath. Under side of fore wings, pale grayish-red.

Described from one specimen received from Mr. James Angus, for whom I have named the species, and one taken by myself in Orono, Me., Aug. 1, 1884.

Steganoptycha lindana, n. sp.

Expanse of wings, from 18 to 20 mm. Head, palpi, thorax and hinder part of fore wings, pale gray, the latter somewhat sprinkled with brown. The outer sides of the palpi, front of the head and forward part of the patagia are more or less tinged with purplish brown. The costal half of the fore wings is dark brown with purplish reflections and darker oblique costal streaks. The darker portion of the wing sends two very dark brown triangular prolongations backward to the fold, one at the basal third and the other a little beyond the middle.

The fringes are gray and flecked with brown. The hind wings and abdomen above are silvery gray, and the under side of the hind wings is the same as above, but reticulated with darker gray on the costa and the outer border. The under side of the fore wings is somewhat darker than the hind wings and shows the markings of the upper side to some extent. Described from one specimen taken in Hamilton, Ontario, and one taken at light in Amherst, Mass., Sept. 18, 1887.

I take great pleasure in naming this beautiful insect for Miss Rose Linda Davis, who has ably assisted me in my entomological work for the last three years.

NEW FORMS OF ICHTHYURA.

BY HARRISON G. DYAR.

Ichthyura multnoma N. SP.

Ground colour of primaries dark "ecru drab" (Ridg. iii., 21, * but much darker), heavily irrorate with "clove brown" (Ridg. iii., 2.) scales which almost entirely obscure the ground colour at the basal portion of the wings as well as outside the third and fourth lines. First (basal) transverse line faintly yellowish, inwardly arcuate from internal margin to median vein, then rectangularly bent towards the base and following the median vein for about 1.5 mm., when it is again bent at right angles and proceeds straight to costa. Second line before middle of wing, consisting of a line of the ground colour bounded outwardly by a narrow clove brown line, straight across wing from internal margin to costa. Third line slightly yellowish, outwardly arcuate from internal margin to vein 2, just beyond its origin, faint across cell, consisting there of a line of the ground colour apparently running straight to costa. Fourth line starting on internal margin, near origin of third line, and running slightly obliquely, but nearly straight to the costa subapically. It is undulated across the subcostal nervules, but is not broadened at costa nor marked with white, being uniformly yellowish. Outside this line subapically, an irregularly triangular rusty brown patch, and another fainter patch on the middle of external margin. A submarginal row of clove brown spots, distinct only below vein 2, being elsewhere lost in the general dark shading of the terminal half of the wing.

Thorax dark gray; the vertex of head and central thoracic patch, deep blackish brown. Abdomen, secondaries and whole under surface, nearly uniform seal brown (very near Ridg. iii., 1, perhaps of a colour between figs. 1 and 2). Expanse, 31 mm. Described from 2 ♂♂, Portland, Multnomah Co., Oregon, April 23.

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*Ridgway's nomenclature of colours, plate iii., fig. 21.

Ichthyura albosigma Fitch., var. *specifica* n. var,

I apply this name to the form of *I. albosigma* from the Rocky Mountains, which differs from the type by its much paler colour. Specimens taken at Manitou, Colorado, May 2.

In accordance with my custom in describing new forms, I give below a table to separate the species of the genus. Under the term "*vau* Fitch and allies," I refer to the nominal species *inversa*, Pack., *vau* Fitch, *brucei*, Hy. Edw., *bifiria*, Hy. Edw., *astoriæ*, Hy. Edw., *ornata*, G. & R., and *inornata*, Neum. I have not at present the necessary material to form a positive opinion as to the synonymy involved here, but I doubt if there are more than three good species, the other names referring to geographical varieties of much the same rank as the var. *specifica* above described.

The names *apicalis*, Barnst., and *incarcerata*, Bd., included in Prof. Smith's list, I have not considered here; but I hope to be able to offer a complete revision of Ichthyura at a subsequent time. The following table will show the relationships of the new forms described in this paper.

§1. Third transverse line running from internal margin at or near the origin of the fourth line and joining the second line at or about its middle.
Fourth line widened and white at costa.
A series of subterminal interspaceal dots.
Lines generally straight, - - *inclusa*, Hb.
Lines more or less, waved, *vau*. Fitch and allies.
Same produced into a series of dashes.
With usual thoracic mark, - - *strigosa*, Grt.
This mark absent on thorax, *luculenta*, Hy. Ed.
No white on fourth line at costa - *jocosa*, Hy. Ed.

§2. Third transverse line free from internal margin to costa.
General colour, dark grayish or clove brown.
Fourth line not widened on costa, *multnoma*, Dyar.
Fourth line widened and forming a white S-shaped mark, - - - - *albosigma*, Fitch.
General colour, much paler, - - var. *specifica*, Dyar,

ANNUAL MEETING OF THE ENTOMOLOGICAL CLUB OF THE A. A. A. S. FOR 1892.

The Annual Meeting of the Entomological Club of the A. A. A. S. will be held during the meeting of the A. A. A. S. at Rochester, New York, August 17th to 20th, 1892, at such times as will least conflict with other features of interest to members. The meeting of the Association of Economic Entomologists, which will be held at the same time and place, will add to the attractions for all interested in the science, and it is hoped that members will make it a point to be present and assist in making the Rochester meeting a successful reunion of all the working entomologists of America. It is urged, also, that every member prepare a paper or papers for presentation before the Club, furnishing the Secretary with the titles in advance, so that a preliminary programme may be drawn up. As most of the members of the Club are also members of the Association of Economic Entomologists, it is suggested that subjects relating to applied entomology be presented before the latter society, reserving for the Club matters of a more purely scientific interest. Systematic, biologic or anatomical studies, together with collecting notes, are especially desired and appropriate.

C. L. MARLATT,
Sec. Entomological Club
of the A. A. A. S.

WASHINGTON, D. C., June 15th, 1892.

OBITUARY.

DR. CARL AUGUST DOHRN.

Entomologists generally will regret to hear of the death of Dr. C. A. Dohrn, which happened on the fourth of May, in his eighty-sixth year, at his home in Stettin, Germany. Dr. Dohrn was born in 1806, and his youth was passed amid the stirring political events with which this century opened on the continent. He visited the University of Berlin in his sixteenth year with the intention of studying the law, but soon devoted himself to literature and music. His translations of dramas from the Spanish attracted attention, and, as a man of letters and musician, he enjoyed the protection of the late King of Prussia, Frederick William IV. Dr. Dohrn was thrown into the society of many eminent persons, and became the friend of Mendelssohn and Alexander von

Humboldt. His taste for natural history was shown early in life, and he finally devoted himself to the study of the Coleoptera, of which he has left a collection containing many varieties. Dr. Dohrn's literary and descriptional articles upon entomology appeared in the Stettiner Entomologische Zeitung, the organ of the Entomological Society of Stettin, over which he presided for more than a quarter of a century. He was a friend of Zeller, and drew the latter from his pedagogic labours in Meseritz to the scientific circle in Stettin, where he closed his career. It was a custom of Dr. Dohrn to give a New Year's greeting in verse to the readers of the Zeitung. These effusions were both genial and humorous, but, as might be expected, invited criticism, and drew from Lederer, on occasion, a bitter remark. Dr. Dohrn's life in his native city was devoted to many interests, and he was made a member of the legislative body. His son, the well-known professor, is the Director of the Marine Zoological Station in Naples, whom I visited so many years since in Jena. Dr. Dohrn was a man of good presence and engaging manners, and has left behind him many friends in many circles. To the general notice, which his death will thus occasion, I may add my little tribute to his worth. Not so long since he sent me greetings through a traveller, and I was glad to hear of him as still hale and hearty. Everything passes in this world, but one is apt to remember gratefully such personal kindness as Dr. Dohrn extended to me.

Bremen, May 6th, 1892. AUG. R. GROTE.

CORRESPONDENCE.

A CORRECTION.

Dear Sir: In my article on "Insect Monstrosities," in the June number, occur some clerical errors that require immediate correction. In line six of the text, *dele* "and Henshaw, Scudder, and Hagen (Psyche)," and read instead, Scudder (Psyche, VI., pp. 89-93) and Hagen (Memoirs of the Museum of Comp. Zool., II., pp. 5-22). I made a mistake in copying my MSS. for the printer, and made it worse trying to correct it by mail. H. F. WICKHAM.

GASTROPACHA ALUCENSIS.

Dear Sir: With regard to the omission of this species from "Mr. Grote's lists," I would state that I was informed that the entire edition of the Chicago Academy Transactions, in which the description appeared, was destroyed in the Great Fire, and that Dr. Packard in consequence regarded his paper as unpublished. The species *Leucophæa Neumoegeni*, Hy. Ed., belongs to my genus *Argyrauges*, Can. Ent., XIV., 215, and is in my opinion sufficiently structurally distinct from *Hemileuca Maia* and allies, a genus in which the common pattern and antennal colour and structure show that the forms have become but recently separated and hardened into species, as seems to be the case with *Datana*, and, perhaps, *Clisiocampa* and *Platysamia*. A. R. GROTE.

Dear Sir : I wish on behalf of the Entomological Society of Ontario, to make public acknowledgment of the eminent services rendered to it, and the lasting benefit conferred on the Canadian members of it especially, by Professor C. H. Fernald, who has reviewed the Society's entire collection of Pyralidæ and Crambidæ, at a great expenditure of labour and valuable time to himself, and with no hope of reward, except the consciousness of having performed an enduring work for the advancement of our science. I forwarded to the Professor, at his own suggestion, the Society's drawers containing these insects, and a box of duplicates, that he might see just how they stood in regard to nomenclature. In due time they were returned, preceded by a communication indicating that they had received the closest scrutiny, pointing out errors, and conveying information which enabled me to bring the collection into harmony with his recent revision of these families, as published in Prof. J. B. Smith's "List of Lepidoptera of Boreal America." The most important of the errors corrected, which may have spread from this to other collections, are two : What was under the name *Crambus præfectellus*, Zink., proved to be *C. Leachellus*, Zink., and what was under the name of *C. sericinellus*, Zell., he pronounced to be but rubbed specimens of *C. albellus*, Clem.

The Professor kindly sent to me an example of *C. innotatellus*, Walk., of which *sericinellus* is a synonym, that I might see what it was like ; it was a species that I had not seen before, and may not properly belong as yet to our list, and the same is possibly true of *præfectellus*.

We have now a collection in these families which may be pronounced a correct standard for comparison and identification as far as it goes, and the guarantee for its reliability is the work done upon it by Professor Fernald. All our members are cordially invited to make use of it.

J. ALSTON MOFFAT, Curator.

NOTES.

We have much pleasure in recording that on the 20th of April last the Degree of "Doctor Philosophiæ Materialis" was conferred *(honoris causa)* upon Baron Charles Robert Osten Sacken, by the University of Heidelberg. This recognition of an Entomologist who has done such eminent service in North America will, we are sure, be very gratifying to our readers.

Mr. C. H. Tyler Townsend, of the Agricultural College, Las Cruces, New Mexico, has gone on a field trip by wagon to the Grand Canon of the Colorado, in Arizona, and expects to be away till the middle of August.

The Royal Society of Canada held its Annual Meeting in Ottawa on the 31st of May and two following days. The sessions were well attended, and many papers of much value and interest were read. A committee was appointed to investigate the condition and prospects of the marine fisheries of the Dominion. The Rev. Dr. Bethune, President of the Entomological Society of Ontario, was elected a Fellow.

BOOK NOTICE.

THE BRITISH NOCTUÆ AND THEIR VARIETIES, by G. W. Tutt, F E. S.: Vol. II., London, Swan, Sonnenschein & Co.: 1892.

The second volume of Mr. Tutt's work is equally carefully compiled with the first, already noticed in these pages. It deals with Guenée's "family" *Noctuidæ*, a group in which the varieties of the species are numerous—not always easy to seize or characterize. By relying apparently on the incorrect statements of Butler, Mr. Tutt refers our North American *Agr. turris* and *texana* as varieties of *Agrotis saucia*. The first, as shown by Smith, is probably the *Agr. ochrogaster* of Guenée, whose description was unidentified by me ; the second is undoubtedly a distinct species, differing structurally somewhat also, from *saucia*. This volume of Mr. Tutt's is a most useful compilation, showing great industry and the marks of a careful research into the literature of the subject. I can heartily commend it to the attention of specialists.

AUG. R. GROTE.

Mailed July 4th.

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THE FIRST LARVAL OR POST-EMBRYONIC STAGE OF THE PEA AND BEAN WEEVILS

BY C. V. RILEY, WASHINGTON, D. C.

In No. 9–10, Vol. IV., of "Insect Life," an account was given of the post-embryonic larva of the Bean Weevil, attention being called to some most interesting characteristics of this larva, which is possessed of temporary thoracic legs and some other structures which admirably serve its locomotive needs until it has entered the bean, when, with a cast of the skin, they are lost and the larva assumes the ordinary apodous form of weevil larvæ. The Bean Weevil *(Bruchus fabae*, Fitch [Riley],) goes on breeding in stored beans, in which respect it differs from the Pea Weevil, as also in the fact that a number of individuals, owing to their smaller size, will develop in the same bean, as many as twenty-eight having been found in a single bean. The eggs are primarily laid upon the bean-pod in the field but chiefly, if not entirely on those which are already mature and ripening, and the larvæ enter the same very much as does the Pea Weevil. But whether laid upon the pods in the field or laid upon the stored beans, the newly hatched larva has to eat its way into the bean and it is able to move about quite briskly by the aid of these temporary legs. Four rather stout but short spines or spurs on the prothoracic shield and four smaller spurs on the anal plate facilitate the penetration of the smooth and rather thin skin of our ordinary beans. The temporary legs are curious in appearance, consisting of three joints, the second long and slender and doubtless corresponding to the fused femur and tibia. The third, which corresponds to the tarsus, is slender and broadened at the tip into a flat pulvillus bearing at the heel a single delicate spur.

Having recently ascertained these facts upon more careful study of the habits of the Bean Weevil, I was curious to learn whether or not the Pea Weevil *(Bruchus pisi*, Linn.,) had similar structures in its newly-hatched larval condition. It has long been know that the egg of the Pea Weevil is laid on the outside of the pod, being fastened thereto, and the newly hatched larvæ recently studied show that in this species also we have the same characteristics that I have referred to in the case of the Bean Weevil. The temporary legs are much shorter and stouter, but similarly constructed, the tarsus proper being merely a spatulate pad. The spurs on the prothoracic segment are more elaborate and more conspicuous. They consist of about six strong retrorse spines anteriorly, succeeded by two more prominent plates, also pointing posteriorly and strongly toothed along their exterior border. There are no anal spurs or spines. An interesting fact connected with this larva is that while ordinarily entering the pea direct from the amber-coloured egg, as previously recorded, it sometimes enters the pod in the neighborhood of the egg and then mines along the inside of the pod for some distance, being quite active and moving rapidly and with ease. This doubtless occurs wherever the egg hatches before the peas are sufficiently developed, the larva living as a miner until the pea is nearly full grown. The entrance of the larva into a pea in such case would seem to be rather by chance than design. As in the case of the Bean Weevil, however, the larva molts and loses its legs and other post-embryonic characters as soon as it has penetrated the pea.

SOME NOTES ON THE MARGINED SOLDIER-BEETLE (CHAULIOGNATHUS MARGINATUS).

BY C. V. RILEY, WASHINGTON, D. C.

Since the larval history of this beetle was published by Walsh in 1868 it has been generally known that the larva is carnivorous, feeding, as Walsh showed, upon the Plum Curculio, and, as I showed, on the Apple Worm among other insects, so that it must be included among our beneficial species. The larva is also one of those which is quite often found during the winter months upon the surface of snow. The beetle is one of the most common species during the summer months upon many kinds of flowers, but particularly upon those of Yucca, feeding principally on pollen, but also sipping the slight amount of nectar which is found at the base of the pistil, or the sweetened exudation which is also quite frequent upon the tip of the petiole of the flower after this has dropped. It is quite frequently found in pairs, and there is no difficulty in getting the female to lay her eggs, but so far as I know the eggs have hitherto been unknown, and no record of them made. It occurred to me, therefore, that a brief statement might be interesting.

The eggs are laid, not in the ground, but on the surface of the ground, and preferably under some shelter, as a stone or a piece of wood. In the vivarium pieces of crockeryware have been made use of. In nature the shade afforded by the dense, more or less recumbent foliage of *Yucca filamentosa* doubtless furnishes a desirable situation. The eggs are laid in clusters, some of them as large as an ordinary pea. They are very pale yellowish, almost white, highly polished and faintly rugose. They are nearly globular, or but very slightly ovoid. I have counted over 300 eggs in a single mass, and each egg measures 0.25 mm. in length and 0.27 in diameter. The newly hatched larva is pure white but otherwise has the same form and general appearance as when full grown.

THE SPECIES OF MAMESTRA.

BY A. R. GROTE, A. M.

By favour of the Secretary of the Smithsonian Institution, I have received a copy of the "Revision of the species of Mamestra by John B. Smith, Professor of Entomology, Rutgers College, Washington, 1891". There are one or two points only upon which I desire here to comment. As a whole the determinations agree with my own. The genus *Dianthoecia* is merged with *Mamestra*, as I at one time proposed from the variability in the same species of the ovipositor. But, as I pointed out in my last Check List, p. 13, the characters of *Dianthoecia*, Bdv., are taken from the habit of the larva, the button-like termination of the wing cases in the chrysalis and the extended ovipositor in the moth. The American forms have been only incompletely studied for these characters. The genus is universally adopted in Europe, and our "cabinet opinions" will doubtless be modified when we come to know the preparatory stages of our species.

So far as the Revision is concerned, I may discuss the following synonymical points. And first, on page 218, my *M. vittula* is very fully described from my type, shown to the author of the Revision by Prof. Snow. Yet, on page 268, this same species is stated to be "unknown", and is further unfavourably commented on as too near to *4-lineata*, while on page 219 the type is said to be "much more nearly allied to *capsularis* than to *4-lineata*". With reference to *subjuncta*, G. & R., I repeat that Guenée himself determined our type as belonging to an undescribed species, received also by him since the issue of the Species Genéral, and for which he had a collection name which we adopted. It seems thus not likely that the *W-latinum* of the Species Genéral could be our species; but much more likely that it is my *atlantica*. On page 233 *cristifera*, Walk., is preferred for *lubens*, on the faith of Mr. Butler's reference. I have seen none of Mr. Butler's papers. My collection has been distributed without my consent or knowledge, nor have I ever been consulted in the slightest way by the British Museum authorities. I saw the type of *cristifera*, Walk., and it was not *lubens*. As stated by me, and cited in the present Revision, the type of *Acronycta cristifera* is not an *Acronycta*, but a stone-gray Hadenoid form unknown to me. I did not examine the eyes, but I should have suspected them to be naked, not hairy, and the type wanted all the brighter shades of *lubens*, while the markings did not suggest to me *lubens* at all. It seems to me that Mr. Butler is in error. According to the Revision, "the type of *cornis* is a very bright, strongly-marked specimen, like (?) typical *olivacea*, but so spread that the insect appears more plump, shorter winged, and differently marked". As the type was one of the specimens marked to be returned to Mr. Hy. Edwards, and was, with all others, so marked so returned, it is possible that I have been momentarily deceived by the brighter tints and peculiar setting. But I knew *olivacea* well, having originally determined the species for Mr. Morrison as then undescribed. It appears that Prof. Smith had re-described *purpurissata* as a *Hadena*, and that the fusion of the stigmata entitles the retention of this name as varietal.

On page 262 I am credited with a species, *M. dodgei*, which I never described, and which is one of Mr. Morrison's synonyms that I did not refer in my lists, but of which I remember to have had a note. I did not know Mr. Morrison's *ectypa*, nor, from the description, could I have suspected it to be my *bella*, which has a close ally, as I pointed out, in the European *Dianthoecia magnolii*. The author of the Revision has compared the types, and the reference is to be accepted. With the exception of *egens*, I believe I am responsible for the use of Mr. Walker's names in this genus adopted in the Revision. The condition of the specimens representing Mr. Walker's types of *Celaena* was so indifferent that it appeared to me they could not be determined, while the descriptions are quite useless. In the list of species of Mamestra, p. 274, the errors as to *vittula* and *dodgei* are repeated. I do not find in the list my *M. mimula* (also omitted in my late Check List) nor Dr. Harvey's *D. pallilis*. Hübner's *confusa* and *mucens* are much like *Hylomiges*, and I so referred them in my Check List, 1875–6. Otherwise the species of North American *Mamestra* and *Dianthoecia* known to me seem to be all included in the Revision, which credits me with thirty-three species and two varieties. I would correct this so far that *lubens* should be restored and that *oregonica* should be added as a variety of *trifolii*. Three well-marked species, *sutrina*, *ferrealis* and *Dimmocki*, are unknown to the author of the Revision. The latter should be recognizable since it is a peculiar form, and the type was in my collection, which latter ought rather to have been preserved as I left it, intact, in the true interests of science. What I must have suffered at having my Noctuidæ overhauled by Mr. Butler may be imagined.

MR. WALKER'S TYPES.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In the CAN. ENT., p. 136, Prof. Smith says that our reference of *Edema ? transversata*, Walk., in 1868, to *lignicolor* is an error. In other cases *e. g. Apantesis radians*, etc., our testimony is borne out, and now comes up the question of a changing in specimens since 1868. Mr Walker's specimens are not marked type, but placed merely above the label. They can have been changed, and the question is, whether a name of Walker's can be employed which in any way contradicts in its description the supposed species. In my Revised Check List 4, I say: "Clearly there is room for misapprehension of what specimens are really types had we not a check for the reference. This is the criterion for types, that they do not contradict the original description," CAN. ENT., XX., 75. If the description of *Edema ? transversata* contradicts *Ellida gelida* in any particular it should not be accepted. If it agrees well with *lignicolor*, our original reference is probably correct. I do not now recall this particular reference, and a possible error in our notes, or their transcriptions, might have occurred. But we knew *lignicolor* very well, and I am the first to restore and interpret this name, reducing *virgata* to a synonym and giving the correct synonymy of the species. I do not object to as rigorous a use of Mr. Walker's names as is consistent with the law of priority. But I object to the putting forward of this or that supposed type of Mr. Walker's without reference to the description. The proposal by Stal and others to ignore the British Museum Lists from their defective composition has been answered by us, with subsequent American lepidopterists, in the negative. I may say that American lepidopterists have made visits at a considerable sacrifice to London for the main purpose of finding out what Mr. Walker described, and they have always accepted cheerfully the result of these visits. It was necessary to build up in America a stable, specific nomenclature. As to the generic, it will always be unstable, partly from the difference in opinion as to what constitutes a genus, partly that here tradition has been stronger than priority. In vain I have shown that *Jaspidea* is older than *Bryophila*, *Heliophila* than *Leucania*, *Graphiphora* than *Taeniocampa.* At least the acceptance of these names is but partial, and I myself have hesitated to use two of them. The necessity for a stable basis for our specific nomenclature is clearly greater than necessity for ideal justice towards this or that American describer, and he must bear his synonym, as he has to bear other injustice in this world. One word as to the employment of double names in the Noctuidæ, and I have done. It is extremely desirable that no two Noctuids should bear the same specific title. The value of a Check List is largely dependent on the carrying out of this rule. Guenée went so far as to change all double names. In the more than seven hundred species of N. Am. Noctuidæ I have described, I have never used a name twice except by accident. Of late there has been an unnecessary duplication of such names. The coat of ice, which the works of European writers on North American Lepidoptera laid upon our knowledge of the scientific titles of our insects has been broken, and to this freeing of our literature I have assisted to the extent of my ability. A responsibility now rests with future American students that they keep the current clear and take large and philosophical views in their classifications.

OVIPOSITING OF MELITÆA CHALCEDON IN PAPER ENVELOPES.

BY RICHARD E. KUNZE, M. D., NEW YORK, N. Y.

In March number, Vol. XXIV, of Canadian Entomologist, Mr. W. G. Wright, of California, mentions a number of genera of diurnals not requiring plants for ovipositing thereon. Those enumerated belong to Parnassius, Argynnis, Euptoieta, Neonympha, Cœnonympha, Hipparchia, Satyrus, Chionobas, and, in part, Chrysophanus. I can add *Melitæa* to his list, which oviposited on two different occasions under circumstances extraordinary but exactly the same. Two years ago I received from a friend, who collects for me in California, but is not a practical entomologist, a lot of *M. chalcedon* papered up. My instructions to kill specimens with chloroform by brushing a little of it over head of each, and at once paper the same after capture, were carried out to the letter. How much or how little each received I do not know. I received the specimens after being in the mail bag six or seven days on their journey from Oakland to New York. On opening paper box I found a lot of little, hairy, black larvæ crawling over contents of box, and soon traced them to an envelope containing a ♀ *M. chalcedon*, with quite a number which had not yet escaped therefrom. There must have been more than fifty living larvæ, which, not knowing their food-plant, I placed in my garden or back yard, so to speak, scattering the lot over cultivated and wild plants, including a White Birch, in the hope that some might find suitable food, and then watch their progress. But all soon died.

In another envelope I found a second ♀ of *M. chalcedon*, which had laid quite a number of eggs, and which I kept a few days pending development of those living larvæ. When those perished I threw away the ova of *chalcedon*. Both females were found dead in their envelopes. But out of some half a dozen females received I found one alive which had to be put into the cyanide bottle.

Another instance of similar ovipositing was that of a Dioptid, *Phryganidia californica*, received in the same way from the same party two years ago. This was not discovered until I took the specimen in original envelope with a lot of other California specimens to my friend, Mr. Charles Palm, of this city, for identification. Most of the larvæ of *P. californica* appeared to have died during period of hatching or shortly afterward, inasmuch as many were not freed from shell of ovum. A number of ova, but very few out of a total number of fifty-three counted, were not hatched or possibly sterile. I did not discover the dead larvæ of this Californian Bombycid until a few months ago while trying to get it determined.

I should also state that the females of *M. chalcedon*, which oviposited in envelopes, were taken a week apart during a period covering two weeks, and would allow about twenty-one days or less for hatching of ova.

LEPIDOPTERA FROM MARSHALL PASS, COLORADO.

The late Mr. W. S. Foster sent me some years ago a list of Lepidoptera taken by himself in 1888 at Marshall Pass, Colorado, which deserves to be put on record as a contribution to the knowledge of alpine entomology. The collecting was done at altitudes from 10,000 to 13,000 feet, on the slopes of the Continental Divide and Mt. Ouray, on the north side of the railroad track. This is in Saguache county, and about forty miles from the district in Custer county, of which the alpine insects are recorded in Can. Entom., 1890. The list is as follows :—

Papilio zolicaon, Bdv.
" *asterias*, Fabr.
Parnassius smintheus, D. & H.
Pieris sisymbri, Bdv.
" *protodice*, B. & L.
" *oleracea*, Bdv.
Colias meadii, Edw.
" *alexandra*, Edw.
" *scudderii*, Reak.
" *eurytheme*, Bdv.
Argynnis freya, Thunb.
" *eurynome*, Edw.
" *helena*, Edw.
Euptoieta claudia, Cram.
Melitœa brucei, Edw.
" *anicia*, Auctt. Amer.
" *palla*, Bdv.
Pyrameis huntera, Fb.
Cœnonympha ochracea, Edw.
Erebia magdalena, Strk.
Chionobas chryxus, Westw.
" *taygete*, Hbn.?
Lycœna shasta, Edw.
Chrysophanus snowi, Edw.
Lycœna melissa, Edw.
Pyrgus centaureœ, Ramb.
Deilephila lineata, Fb.
Alypia lorquinii, G. & R.
Gnophaela vermiculata, G. & R.
Nemeophila plantaginis, Auctt.
Plusia hochenwarthi, Hoch.
Drasteria erechtea, Cram.
Botis turmalis, Grt.

Mel. brucei is the real *anicia*, and *anicia*, Auctt. Amer., should apparently be called *meglashanii*, concerning which see 12th Rept. Colo. Biol. Assoc. *Nem. plantaginis* of the Colorado Mountains would now, I suppose, be referred to *petrosa*, Walk.

In Prof. J. B. Smith's list of Lepidoptera, while *petrosa* is accepted as distinct, "*hospita*, Schiff." is referred to it as a variety. This latter is, however, a variety of the European *N. plantaginis*, L., and consequently the American *hospita*-like aberration apparently requires a new name. *Botis turmalis* is now referred to *itysalis*, Walk. The doubtful *Chion. taygete* is very possibly the species lately named *C. brucei* by Mr. W. H. Edwards.

Of the thirty-three species enumerated, about half may be regarded as specially alpine ; the others occur also at much lower elevations.

T. D. A. Cockerell.

Institute of Jamaica ; Kingston, Jamaica. April 18, 1892.

BIOLOGIC NOTES ON NEW MEXICO INSECTS.

BY C. H. TYLER TOWNSEND, LAS CRUCES, N. M.

HEMIPTERA-HETEROPTERA.

All of the following species were determined by Dr. P. L. R. Uhler :—

Lioderma ligata, Stal.

In coitu on mesquite *(P. juliflora)*, July 14. It was found numerous on Chinese cabbage on college farm July 16.

Mozena obtusa, Uhler MS.

Taken in July on *Prosopis juliflora*. *In coitu* July 8.

Chelinidea vittigera, Uhl.

Taken *in coitu* May 24 on a small fruit of *Opuntia*, Soledad Canon.

Hadronema militaris, Uhl.

Swept from alfalfa May 12.

Neurocolpus nubilus, Say.

This capsid was beaten extensively from flowers and foliage of mesquite *(P. juliflora)* May 10. May 12 to 16 both adults and larvæ were beaten. The adults vary from a light yellowish or greenish to brown and almost black, usually more or less mottled. They doubtless grow darker with age. The larvæ are of a clear, light green colour.

Calocoris superbus, Uhler.

This capsid is numerous on alfalfa, both adults and larvæ, and doubtless causes considerable injury to the plant. May 8 to 12 both stages were found in abundance. May 28 the adults were numerous, and a few nymphs were found. The adult is blackish, with orange or yellow on the sides. The larvæ and nymphs are green, with the extremity of the body brown. Predaceous heteroptera and lady-birds were also swept, which doubtless prey upon the capsid.

Calocoris sp. ?

Beaten from scrub oak *(Quercus undulatus* var. *Wrightii)* in Soledad Canon May 24. It is very pale yellowish, with faint brownish markings. Oak determined by Mr. W. H. Evans.

Lygus pratensis, Lin. var.

Adults and larvæ swept from alfalfa May 12. Only adults swept May 28. The adults vary from light green or glassy to a uniform light and dark brown, and one specimen has only the posterior portions brown. The larvæ are green with black dots on the thorax, and one black dot in the middle of the first abdominal segment. This species is also, I believe, injurious to the alfalfa.

Rhinacloa forticornis, Reut.

Beaten from scrub oak *(Q. undulatus*, var. *Wrightii)*, May 24, in Soledad Canon. It is blackish or brownish, variegated with pale yellowish or silvery. Also beaten, May 28, from alfalfa.

Halticotoma valida, Uhler.

This is a stout looking, short capsid, bluish-black in colour, with the head and thorax reddish-brown. It was found very numerous from May 15 to June 2, on leaves of both *Yucca augustifolia* and *Y. macrocarpa (?)*. They do not fly readily, but run down to the base of the leaves and are thus hard to catch. Both adults and young were found, May 15, puncturing the leaves. The larvæ are also bluish-black in colour.

Macrotylus desiccatus, Uhler MS.

Both adults and larvæ of this capsid were found on mesa April 4 infesting plants of *Senecio douglasii*, which they puncture. Both larvæ and adults are greenish. Plant determined by Prof. Wooton.

Tuponia herbacea, Uhler MS.

This small, light green capsid was beaten from mesquite *(P. juliflora)*, May 12 to 16. No larvæ were found. On May 28 specimens were swept from alfalfa, which I cannot distinguish from this species.

Tuponia, n. sp.

A single specimen of a bright green capsid with the tips of the hemelytra brown, was beaten from *Larrea mexicana* May 15. It is about 5 mm. long.

Triphleps insidiosus, Say.

Swept in numbers from alfalfa May 12 to 28.

HEMIPTERA-HOMOPTERA.

The following named species, when not otherwise stated, were also determined by Dr. Uhler :—

For notes on several new species, and one new genus of *Coccidæ* see Bulletin No. 7 of the New Mexico Agricultural Experiment Station, June, 1892.

Pemphigus populi-ramulorum, Riley.

This twig gall is found on our cottonwoods *(Populus fremontii)*. Green galls were found, June 29, which contained inside small lice with cottony coverings. Winged specimens issued from the gall July 5. Determined by Dr. Riley from galls.

Pachypsylla venusta, O.-S.?

Petiole galls were found at bases of leaves of *Celtis occidentalis* (hackberry) at Riley's ranch in the Organ Mts., May 14, which exactly resemble those of this species so far as I can determine. The galls were at that date, from one-third to one-half of an inch in diameter ; and the eggs were apparently just hatching, or about to hatch. The tree was determined by Mr. W. H. Evans.

Psylla, n. sp. (?)

Adults and larvæ of a psyllid were beaten from mesquite *(P. juliflora)* May 14 to 16. The adults are greenish or yellowish, with brown at the extremity of the wings. The larvæ are entirely green.

Cicada montezuma, Dist.

This cicada was noticed to be very numerous on the mesas and plains from May 23 to 31. They seem to frequent especially the plants of *Yucca angustifolia*. On May 24, while riding on horseback, I was quite sure I observed one specimen with its proboscis thrust into a leaf of this *yucca*. It is very probable that this cicada oviposits in the leaves of this plant, since it seemed to have such a decided preference for it. I am quite sure it also pierces the leaves and stalk for food. The specimen referred to above was motionless, and evidently feeding. A cicada was heard on the mesa May 17. It was either this species or the next, but was not captured.

Cicada ochreoptera, Uhler.

This species was found May 27 on mesa near the college. A pupa skin was also found there. On June 9 it was found very numerous on pear trees, and I was told that in former years it had damaged many of the trees by ovipositing in the twigs quite extensively. I have also found its work on twigs of young plum trees, which had been damaged by it, causing the terminal half of the twigs to die. On Feb. 4 a cicada larva, probably this species, was dug up about the roots of a young apple tree in Mesilla. It was about half an inch long, and was found at a depth of about eight inches. This cicada seems rather confined to the valleys, while the preceding and larger species is only found on the mesas and plains.

Stictopelta marmorata, Goding MS.

This tree-hopper was noticed July 8 on mesquite *(P. juliflora)*, in some numbers. It was also previously noticed on weeds. Determined by Dr. F. W. Goding.

Publilia modesta, Uhler.

Adults beaten in some numbers from flowers and foliage of mesquite

(P. juliflora), May 10 to 12. The hemelytra are yellow, mottled with brown. A specimen swept from alfalfa May 9 is determined by Dr. Uhler, with a query, as this species.

Cyrtolobus annexus, Uhler.

Quite a number of this small brown tree-hopper were beaten from flowers and foliage of *P. juliflora* May 10 to 12. Two larvæ, apparently belonging to this species, were beaten May 10. The larvæ are also brownish.

Stictocephala inermis, Fab.

Quite numerously swept from alfalfa May 9 to 28. The adults vary from wholly green to largely reddish on upper portions. No larvæ found.

Gorgora atlas, Goding.

Adults beaten, May 13 to 15, from twigs and leaves of *Larrea mexicana*. Larvæ were beaten May 15. The adults are of a rich dark brown colour, and peculiar form. The larvæ are greenish. Both adults and larvæ are not readily dislodged from the *Larrea* twigs or leaves, and the adults rarely take wing. This was formerly determined by Dr. Uhler as *Centrodontus biundulatus*, Uhl. (prob. MS.). A specimen was sent to Dr. Goding for insertion of the species in his catalogue, and he wrote me that he had already described it as above, under a new genus.

Typhlocyba vitifex, Fitch.

I notice in Bulletin 19 of the Colorado Station that specimens of the vine leaf-hopper, as it exists in Colorado, have been sent by Professor Gillette to Professor Osborn and Mr. E. P. Van Duzee, who have determined it as *T. vitifex*, Fitch. Our species in New Mexico is apparently the same. I had always noticed the marked difference between this and *T. vitis* in the markings of the hemelytra, but from the fact that many authors accepted these as varieties of one species, I had preferred to consider our form as a variety of the eastern one. Our form does not possess the black spots at base of scutellum, as in var. *coloradoensis*, Gillette. The larva is pale yellowish, with four black spots on the thorax.

Agallia 4-punctata, Prov.

This small, short, grayish leaf-hopper was swept in large numbers from alfalfa May 9 to 28. Larvæ were swept May 12 to 28. *In coitu*, May 28. The larvæ are also grayish.

Gypona angulata, Spang.

Several of this species were swept from alfalfa May 12 to 28. It is light green in colour, and about 8 mm. long. It probably punctures the alfalfa.

Platymetopius acutus, Say.

Swept from alfalfa May 12. It is small, brownish or grayish in colour, with pointed head.

Oecleus decens, Stal.

Found, May 15 to June 2, on leaves of both *Yucca angustifolia* and *Y. macrocarpa* (?), in which its egg-punctures were very numerous.

Thysanoptera.

The following species were determined by Professor H. Osborn :—

Thrips tritici, Fitch.

Swept in great numbers from alfalfa May 12 to 28. It undoubtedly does much harm to the plant. The same species was also beaten in countless numbers from mesquite *(P. juliflora)*, May 16.

Thrips, sp. (?)

On May 5, 1891, some curious cluster-like galls were noticed on our cottonwoods *(Populus fremontii)*. At first they were noticed only on staminate trees, and consisted of clusters of staminate flowers reverting towards a leaf-development. More staminate galls were found on May 7, and also two or three pistillate clusters. On all of these gall-clusters there were present large numbers of an immature thripid, which Professor Osborn says appear to be different from *Thrips tritici*, and possibly belong to a different genus. Whether this thripid has anything to do with these abnormities must be proved by future investigation. It did not seem to be found on the foliage, but was perhaps found on all the flowers.

Coleothrips trifasciata, Fitch.

Swept from alfalfa May 28. Doubtless causes more or less injury, though it was by no means so numerous as *Thrips tritici*.

Orthoptera.

Homeogamia, n. sp.?

This is a whitish roach which is sometimes attracted to light in the evening, if I remember rightly. It is quite different in appearance from its eastern allies. Determined by Prof. Bruner.

Ceuthophilus pallidus, Thos. (?)

This is a white cricket which was found, June 10 to 27, in houses eating holes in lace curtains and other fabrics. It is reported to cause much damage in this way. Prof. Bruner writes that it does not quite agree with Thomas's description.

Acridium shoshone, Thos.

For a week or two during the first part of July, I noticed the mesquite *(P. juliflora)* to be greatly infested with this large greenish locust, which was so numerous as to almost defoliate some bushes. On July 14 many nearly leafless bushes were seen, from which, on one's approach, would fly swarms of these locusts.

Melanoplus, sp.

A number of specimens of our ordinary species of Melanoplus were put in a breeding cage with earth June 28 and 29. On July 24 the cage was full of young locusts. The old ones had been transferred to another cage a couple of weeks before. No eggs were taken up with the earth put in the cage, since this was dry sand which had been carefully looked over.

Boötettix argentatus, Bruner.

This locust was found in large numbers on *Larrea mexicana* July 17, 1891, and on no other plant. It is of a beautiful rich green, variegated with velvet-brown, black and silvery-white, and apparently lives only on the *Larrea* on the mesas. Its colour assimilates well with the peculiar green of the *Larrea* leaves. On May 13, 1892, I found on *Larrea* some very small locusts of a general greenish colour, which I am quite sure are the larvæ of this species. The creosote bush is in all probability the food-plant of this locust. Determined by Professor Bruner.

LEPIDOPTERA.

Synchloe crocale, Edw.

The red and black, more or less spiny caterpillars of this butterfly were found, about June 5, on *Helianthus*, sp. They live in colonies. The last of June they were not to be found. Again, on July 28, a good number were found and transferred to a breeding-cage, in which they pupated July 30, suspending themselves from the top of the cage inside as chrysalides. A half dozen imagoes issued August 3. This butterfly is, therefore, two-brooded, and very likely three-brooded. Determined by Mr. W. H. Edwards.

Triptogon modesta, var. *occidentalis*, H. Edw.

A large, light green sphingid larva was found, August 29, on the cottonwood *(Populus fremontii)*. On being placed in jar it immediately went into the earth. The imago of this species issued March 25 following. Determined by Dr. J. B. Smith.

Sannina, sp. (?)

On July 7 a great number of pupa skins of what seemed to be an Ægerian were found sticking out of the ground near roots of mesquite *(P. juliflora)*, on the mesa near college. The perfect insects had all emerged. Digging in the ground failed to disclose any pupæ. I believe this is a sesiid which bores the mesquite roots.

Thyridopteryx, sp.

Our native bag-worm is found here principally on small trees of black locust *(Robinia pseudacacia)*, which have been brought in. It is also found on apple, and I have found its bags on tornillo *(Prosopis pubescens)*. The bags of those on locust are woven on the outside with the leaf-stems of the locust; those on tornillo have the thorns of the tornillo beautifully woven in. A large number of bags cut open, March 15, 1891, revealed only larvæ, which are thick-bodied, brown or black, and an inch or more in length. Through September it was noticed that many of these larvæ, with their cases attached, were crawling on the ground in the vicinity of locust trees. October 5 a large number of these were placed in a breeding cage. They crawled to the top of the cage, and there fastened their bags by spinning a small quantity of silk. In this suspended condition they passed the winter. Nine male moths issued from May 24 to June 1, 1892. The males are of a soft, light, brownish colour, and possess remarkable genitalia. The pupa skins were usually almost entirely extruded from the bag, showing that the pupa works itself nearly out, only retaining its hold by fastening its extremity into the silken lining of the bag near the lower orifice. The adult females may or may not be fertilized in their bags. All the females I have observed were found to have dropped from the bags to the earth of the cage. Some were simply a skin stretched over a mass of eggs, indicating that fertilization had been accomplished, while others showed no such indication. Four females issued from their bags, as well as their pupa skins, May 27 to 31, and were found upon the earth. The female is almost entirely whitish, and grub-like in appearance except the head and genitalia. There are some rings of brownish hair near the posterior extremity of the body. June 9, on cutting open the remaining bags, a live male pupa was found, several larvæ, and an adult female. The latter was dead and contained eggs apparently half formed, as though developed to a certain stage but not fertilized. In one bag, with a dead larva, there was found the puparium of a tachinid parasite with the contents dead and more or less decomposed.

Hemileuca juno, Pack.

On June 15, 1891, a number of large, spiny, warted bombycid larvæ were found on willow *(Salix*, sp.). They were nearly full grown. June 24 to 30, the same larva was found on cottonwood *(Populus fremontii)*

One changed to a pupa in ground July 6, and another was at that date burrowing in the earth. The two pupæ were sent to Dr. Packard, who wrote me under date of April 20, 1892, that one pupa had disclosed a female moth, which proves to be probably this species. The other pupa was a male and had not yet burst. May 22, 1892, half-grown larvæ, apparently this species, were found on willow. May 31 larger specimens were found on cottonwood *(P. fremontii)*.

Eucaterva variaria, Grote.

This moth was bred from thin net-like cocoons found on terminal shoots of *Chilopsis saligna*, August 25, the moths issuing Aug. 28. The cocoon is very thin, formed of silk, with the nearest leaves fastened to it on the outside. (See *Psyche*, April, 1892.) The moth is silvery, speckled with blackish. I have noticed the *Chilopsis*, through September and October, both near Mt. Picacho and about the entrance to Soledad Canon, to be full of the empty cocoons of this moth. A tachinid was bred from the cocoons about Sept. 5. (See *Psyche*, l. c.) Determined by Dr. Skinner.

HYMENOPTERA.

Andricus, sp. (?).

While looking over, in March, specimens of plants collected the previous summer, Prof. Wooton handed me some scrub oak leaves, one of which possessed on the underside a reddish, woolly, hymenopterous gall. Each section of the gall contained a perfect gall-fly, which had transformed within, but had been unable to escape while the plant was in press. Determined by Dr. Riley. The oak is *Q. undulatus* var. *wrightii;* determined by Mr. W. H. Evans.

Synergus, sp. (?).

Scrub oaks *(Q. undulatus* var. *wrightii)* near Riley's water in the Organ Mts. were found hung full of a large and very hard twig-gall about the size of an apple. From a large gall which was brought home to breed the flies, there issued, from April 6 to 20, about two dozen gall-flies. The gall was 2½ inches in longest diameter, and 2 inches in shortest. It contained twenty-three exit holes April 20. The flies are brown or blackish, with hyaline wings. Determined by Dr. Riley.

Decatoma, sp. (?).

From the last mentioned gall there also issued, on April 20 and May 19, two apparent inquilines of this genus. They are of a brownish flavous colour, and the eyes are of a beautiful light carmine in life. Determined by Dr. Riley.

Chalcididæ (?).

Prof. Wooton handed me in April a pod of a native species of *Lotus*, with some chalcid (?) flies which had issued therefrom in his herbarium. The pod is very small, and the plant was collected the preceding June. The flies are black, and several holes in the pod show where they had issued.

A LIST OF THE BUTTERFLIES FOUND AT MARSHALL, MISSOURI, AND VICINITY.

BY OLIVER J. STALEY.

Marshall is the county seat of Saline county, about twenty miles south of the Missouri River and eighty-nine miles east of Kansas City, and situated among woods and fields ; on the west and south open farming country, and on the east and north for three or four miles woods.

I have been collecting here for three years, and believing that a list of butterflies which are found here may be interesting to others I present this list.

By vicinity I mean five miles from town in any direction.

Danais archippus, Fab.

This is about the most common butterfly. I have taken it from April to November. *D. berenice* I have never found here.

Euptoieta claudia, Cram.

Rare ; have taken but four or five specimens. Found chiefly in July.

Argynnis cybele, Fabr.

This is the only species of Argynnis which I have found here, and usually it is common, but last year (1891) I only saw one specimen. It is here from April to the middle of October.

Phyciodes nycteis, Db.-Hew.

I have taken a number of specimens, but it cannot be said to be common. They are found here during the summer months.

Phyciodes tharos, Dru.

This species is common from the middle of April to October, and may be taken in almost any numbers.

Grapta interrogationis, Fabr.

Both varieties are very common, but *Umbrosa*, Lint., most so. I have never seen any later in the fall than the last of October, which is the month in which most of our butterflies disappear.

Grapta comma, Harr., var. *Harrisii*, Edw.

One specimen taken in September near Shackleford, about five miles west of here.

Grapta progne, Cram.

This is found all through the summer, but is most common during September.

Vanessa antiopa, Linn.

Very rare ; have seen but three specimens, one in March, one in July and one in November.

Pyrameis atalanta, Linn.

Very common from April to October.

Pyrameis huntera, Fabr.

The least common of its genus but not uncommon, and is found from May to October.

Pyrameis cardui, Linn.

Very common during the same months.

Junonia cœnia, Hbn.

Uncommon, but a few specimens seen every year from July to October.

Limenitis ursula, Fabr.

Not uncommon from May to October.

Limenitis dissippus, Gdt.

Found mostly in August around maple trees ; not uncommon.

Apatura celtis, Bd.-Lec.

Not common and is found in numbers only in a yard in town which has a hackberry tree. August is when most are seen.

Debis portlandia, Fabr.

Common all through the summer months.

Neonympha eurytris, Fabr.

Common from May to September, and is found chiefly near the bottom of gullies which have grassy sides.

Satyrus alope, Fabr., var. *Olympus*, Edw.

Very rare ; have seen but two specimens.

Libythea bachmani, Kirtl.

Usually not uncommon through the summer months.

Thecla melinus, Hbn., var. *Humuli*, Harr.

Very rare ; have taken but one specimen.

Feniseca tarquinius, Fabr.

Very rare ; took one specimen, somewhat broken, in an opening in the woods in September.

Chrysophanus thoe, Bd.-Lec.

Rare ; a few specimens were captured by a friend west of Marshall in September.

Lycæna pseudargiolus, Bd.-Lec.

The form Pseudargiolus is very rare; found mostly in July and August.

Var. *Violacea*, Edw.

This form is common and seems to be found at all times through the spring and summer.

Var. *Neglecta*, Edw.

This also is common and most so during the summer months.

Lycæna comyntas, Gdt.

Common, and is found as late as October.

Lycæna isola, Reak. or *Alce.*, Edw.

I have taken a few specimens but only in October; have not seen anything of them at any other time.

Pieris protodice, Bd.-Lec.

Common through the summer.

Pieris rapæ, Linn.

Too common from April to October.

Nathalis iole, Bdv.

Rare; found only in September.

Colias eurytheme, Bdv.

Very common, from April to November; have taken a few Albinos of this species in October.

Var. *Keewaydin*, Edw.

Not uncommon; a few taken in August, but most in latter part of September and October.

Colias philodice, Gdt.

This is our most common butterfly, and is found from early in April to middle of November. It is more common than *C. eurytheme*.

Colias caesonia, Stoll.

Common through summer months.

Terias nicippe, Cram.

Rare; have taken but one specimen, but that was perfectly fresh; October.

Terias lisa, Bd.-Lec.

Common, but most so in September and October. Have taken white females of this species.

Papilio ajax, Linn.

Not uncommon in variety *marcellus*, Bdv., but *telamonides* is rare. This species I found very hard to capture on account of the colour and the skill they have in dodging the stroke of the net.

Papilio turnus, Linn.
Common all through the summer.

Papilio cresphontes, Cram.
Common from April to September.

Papilio asterias, Fabr.
Common through the summer.

Papilo troilus, Linn.
From April to October may be seen; not very common at any time.

Papilio philenor, Linn.
Common; found from April to middle of October.

Ancyloxypha numitor, Fabr.
Not uncommon in the fall.

Pamphila zabulon, Bd.-Lec.
Common.

Pamphila huron, Edw.
Have taken a few specimens in October.

Pamphila peckius, Kirby.
Common in latter part of summer.

Pamphila cernes, Edw.
Common; most so of its genus; found all through summer and fall.

Pamphila verna, Edw.
Nearly as common as "*cernes*", and found with that species.

Pyrgus tessellata, Scud.
Common in October—not very much before.

Nisoniades juvenalis, Fabr.
Common on flowers in September; seen occasionally during the summer.

Pholisora catullus, Fabr.
Not uncommon; found principally on flowers.

Eudamus bathyllus, S. & A.
Rare. I have only found this east of Marshall, along the C. & A. R. R., and only in October.

Eudamus tityrus, Fabr.
Common all through summer.

Paphia troglodgta, Fabr.
Not uncommon; mostly seen in September, and delights in resting on dead brush, where it may be easily taken.

Callidryas sennæ, Linn.
Rare through summer, and very hard to capture; but in latter part of September is common, and while resting on flowers may be taken with the thumb and finger.

Mailed Aug. 2nd.

The Canadian Entomologist.

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FOURTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

The fourth annual meeting was held in the University building, Rochester, N. Y., on Monday and Tuesday, August 15th and 16th, the President, Dr. J. A. Lintner, of Albany, N. Y., occupied the chair and Prof. F. M. Webster, of Wooster, Ohio, filled the office of Secretary. The following members were also present :—C. V. Riley and L. O. Howard, Washington, D. C.; D. S. Kellicott, Ohio ; John B. Smith, New Jersey ; E. B. Southwick, New York ; H. E. Weed, Mississippi ; M. V. Slingerland, New York ; H. Osborn, Iowa ; J. Fletcher and C. J. S. Bethune, Ontario ; C. H. Perkins, Vermont ; P. H. Rolfs, Florida ; S. A. Forbes, Illinois.

Owing to the ill-health of the President, the annual address was delivered by the Vice-President, Prof. Forbes, in which he treated especially of the work that has recently been done on the contagious diseases of insects, and the satisfactory results that have thus far been obtained. He also referred to the successful importation of several insect parasites, and drew the attention of the meeting to the desirability and importance of studying the aquatic insects of America and their relations to fish culture. This able and highly interesting address was subsequently reported upon by a special committee who warmly commended it, and urged upon the attention of economic entomologists the recommendations in regard to " Aquatic Entomology " and its bearings upon fish culture.

Prof. Kellicott read a paper upon " Hypoderus Columbæ ", a mite which is parasitic upon pigeons.

A paper by Mr. C. H. Tyler Townsend was read on " The possible and actual influence of irrigation on insect injury in New Mexico ", in which he showed that in that region of the country irrigation may be made to exert a valuable influence as an adjunct to the proper use of arsenites and kerosene.

Prof. Kellicott read "Notes on Ægeriadæ of Central Ohio, No. II.", which is published in full.

Prof. Smith said that adults of the Squash borer, *M. ceto*, from last year's larvæ were now flying on Long Island, and that all stages of the insect might be obtained in the same field. The moths gather in the evening on the upper sides of the leaves, and are collected in great numbers by the farmers. Messrs. Forbes, Slingerland and Smith stated that in their experience the Ægerians were not attracted by electric light.

A paper on "The Bean Weevil, *Bruchus obsoletus*", was read by Mr. V. Slingerland, in which he described the mode of ovipositing, and gave a brief account of the life history of the insect. He stated that bisulphide of carbon will destroy the insect in all stages. He also read a paper on "*Drasteria erechtea*", in which he stated that in 1889 over two thousand specimens were taken by means of trap lanterns at Ithaca, N. Y. Last year he bred a number of specimens, and as a result ot the study of the material thus obtained, together with about three hundred specimens sent him from all sections of the country, he came to the conclusion that there are two species, about equally common, included under the name *erechtea*, and that these should be called *D. erechtea*, Cram., and *D. crassiuscula*, Haworth, with *ochrea* and *distincta* as varieties of the latter. He then proceeded to describe the differences between the species, and recommended the plowing of infested fields in order to destroy the larvæ and pupæ

A paper by Mr. T. D. A. Cockerell, of Kingston, Jamaica, on "*Orthezia insignis* as a garden pest", was read by the Secretary. The writer stated that the insect was first observed on a variety of exotic plants in the hot houses at Kew and elsewhere, and that he now found it injurious to several garden plants in Jamaica.

A paper by Dr. F. W. Goding on "The Food Plants of North American Membracidæ" was next read. This was followed by Prof. J. B. Smith's paper: "Notes of the Year in New Jersey", in which he referred to the principal insect attacks that had come under his notice. In the discussion that followed remarks were made by Mr. L. O. Howard, Prof. H. Osborn, Dr. Lintner, and Prof. F. M. Webster.

Mr. Webster drew attention to the occurrence of *Phytonomus punctatus* to an injurious extent in North Eastern Ohio, and of *Hylastes trifolii* attacking peas in Northern Ohio. He stated further that *Otiorhyncus ovatus* was found feeding upon the foliage of musk melons.

A paper on "Two Serious Pear-tree Pests" was read by M. V. Slingerland, of Cornell University.

1 The Pear-tree Psylla *(Psylla pyricola)*.—This insect is described as one of the most serious pests that pear growers have to fear. It had appeared in the valley of the Hudson in enormous numbers during 1891, orchards which had given promise of 1,200 barrels of fruit having perfected less than one hundred barrels. The Pear-tree Psylla, when mature, is scarcely 3 mm. in length, and shaped like a miniature Cicada. The nymphs are oval and very flat, and produce a great deal of honey-dew, which renders the trees unsightly. There are three and perhaps four broods in the year, and it is in the perfect state that the insect hibernates. As a remedy Mr. Slingerland had found that the nymphs were easily destroyed by a very weak kerosene emulsion (two per cent.) Washing the trees in winter to destroy the adults was also recommended.

2. The Pear-leaf Blister mite *(Phytoptus pyri)*, was alarmingly on the increase in the United States and Canada. It is a very small mite, which hibernates beneath the bud scales of the pear tree, and comes out when the leaves expand in spring and forms blister-like galls on the foliage. Spraying the trees during the winter with kerosene emulsion had been found successful.

Prof. Lintner stated that *P. pyri* was very abundant in Eastern New York.

Prof. F. M. Webster had also found it abundant in Ohio. Spraying with Bordeaux mixture had shown no effects in reducing the leaf-blisters.

Prof. J. B. Smith had found that in orchards sprayed with the ammoniacal solution of carbonate of copper, mixed with London purple, the pest was perceptibly lessened.

Mr. Southwick read a paper upon *Depressaria heracleana*, the Parsnip web worm, and gave an interesting account of the war waged upon it by the "Potter Wasp", *Eumenes fraterna*, and stated that he had bred from it a Hymenopterous parasite, a species of *Limneria*.

Mr. Howard read a paper, "An Experiment against Mosquitoes," which was listened to with great interest. A small quantity of coal oil was distributed over the surface of a small mountain lake, and enormous numbers of the larvæ and perfect insects were destroyed.

Interesting notes of the year were read from Mississippi by Prof. Howard Evarts Weed.

With regard to the Horn Fly, Prof. Smith stated that it was not more abundant in New Jersey than the ordinary cattle fly *(Stomoxys calcitrans).*

Prof. Kellicott said that his son had found it very abundant in Central Michigan.

Mr. Weed thought that dark coloured cattle were most subject to attack. He also recorded that the insect now occured in Louisiana.

Dr. Bethune stated that the Horn Fly had this month been noticed for the first time in the Province of Ontario at Oshawa, Toronto and London, and was creating some alarm among stock owners.

Mr. P. H. Rolfs had found the Horn Fly in Florida.

Mr. Osborn read Notes on Injurious Insects in Iowa. For want of time the discussion on this interesting paper was deferred.

Prof. C. V. Riley read a paper on Rose Saw-flies, in which it was shown that there were three distinct species attacking roses.

AFTERNOON SESSION.

On reassembling the following members were elected:—Prof. P. H. Rolfs, of Florida; Mr. H. A. Gossard, of Iowa, and Mr. C. F. Baker, of Colorado.

A paper on Plant Faunæ by Mr. T. D. A. Cockerell, of Kingston, Jamaica, was read.

Mr. James Fletcher read a paper on Injurious Insects of the year in Canada. This gave rise to a long and interesting discussion on several points brought up in the paper, particularly with regard to the life history of *Gortyna immanis*, the different kinds of Knapsack sprayers, and the most practical remedies for the Horn Fly.

Prof. Webster read a paper on the Aphidivorous Habits of the Common Slug *(Limax campestris)*, which was discussed by Messrs. Riley, Smith and Howard.

Dr. Bethune had found slugs upon trees he had sugared for moths.

The following officers were elected for the ensuing year:—President, Prof. S. A. Forbes, of Illinois; 1st Vice President, Dr. C. J. S. Bethune, of Canada; 2nd Vice-President, Dr. J. B. Smith, of New Jersey; Secretary, Prof. H. Garman, of Kentucky.

The meeting then adjourned.

NOTES ON AEGERIADÆ OF CENTRAL OHIO—II.

BY D. S. KELLICOTT, COLUMBUS, OHIO.

The first collection of notes on the Aegeriadæ of Central Ohio was published in the current volume of the Canadian Entomologist. Since the former notes left my hands additional observations have been made, and a few more species collected. Inasmuch as I shall have something to say of the destructive habits of the larvæ of these species, this seems to be the appropriate place to present these notes.

Melittia ceto, West.—Concerning this species, in view of the facts cited, I said in the former paper, "It seems in view of the facts at hand that in Central Ohio and South it is double brooded." In the May number of the Canadian Entomologist, Prof. J. B. Smith has an interesting note throwing light upon this question. His quotation from the MS drawings by Abbott clearly proves that in Georgia it has two annual broods He also cites the facts of his own observations in New Jersey, and expresses his disagreement with my inference for the latitude of Central Ohio. He may be right; I am simply waiting to see. I still think there is something in its life-history not yet explained.

Larvæ put into breeding cages in September last gave imagos in May and June. Larvæ were found destroying the squash plants early in July; by the 15th to 20th I transferred the plants to breeding cages, with larvæ of different sizes. These shall be carefully watched, and the result reported.*

Sciapteron tricincta, Harris.—This species was reared by me several years since at Buffalo, N.Y., from enlargements of the branches and stems of *Populus candicans* and *Salix* caused by the larvæ of *Saperda moesta* and *Saperda concolor*. The present season I have found it at Columbus, with similar habits, in the stems of the willow injured and enlarged

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*Note, Aug. 8.—By August 1st a few larvæ had left the stems and entered the ground; by the 8th, the day of last examination, many had done so. Small ones are comparatively few. Among the smaller ones there was an abundance of that second form described by Prof. Scudder, in Psyche, Vol IV., p. 303. Some of these were isolated, and after a few days they moulted, giving the typical form. This seems to prove that there is but one species. It may be interesting to note that these larvæ will feed in the stems and roots of *Echinocystis lobata*; also in the fruit of the musk melon. I have not watched them to maturity in either.

Note 2, August 26.—On my return to Columbus, August 25, I found that three examples of the imago had emerged in the vivarium from the larvæ placed therein between July 15 and August 1. My son had noted the dates of appearance, as follows:—One each on the 20th, 21st and 23rd; to-day a fourth emerged, and three fresh ones were captured in the field. These facts I consider sufficient to prove that in Central Ohio there may be a second brood.

by the larva of *S. concolor.* The beetles appeared from the middle of May to the middle of June; the female gnaws deeply through the bark into the wood, generally near a branch, and places an egg at the bottom of each pit; the larva is soon burrowing under the bark and into the wood; there are often several at the same point. The Aegerians appear later in June and July and place their eggs in the excrescenses caused by the boring young of the beetle. I have not yet found instances in which it was clearly apparent that the young Sciapteron had made its own way into uninjured stems. This fine moth is seldom seen on the wing, but is easily obtained by gathering the stems infested by *Saperda* in May and keeping them moist for a few weeks.

Aegeria corni, Hy. Edw.—The trunks of the maples at Columbus are greatly disfigured by the larvæ of *Aegeria acerni.* The branches also suffer to a large extent by the action of another aegerid infesting them. The former pest is confined almost wholly to the trunks of shade trees; the latter occurs in both shade and forest trees—most numerously in the latter or perhaps in isolated trees in the fields.

The branches ranging from mere twigs to those an inch or two in diameter are found much enlarged, often at several different points, into rough barked and gnarled excrescences; these are often nearly globular, more often, however, oblong, and frequently there are openings into the centre of the stem. On cutting into the wood it is found to be mined in various directions and decaying; this often causes the branch to die or so weakens it that the winds throw it down. There may be one or more larvæ in a single excrescence.

The mature larvæ are 12 to 15 mm. long; body slender, white; the skin is transversely folded, especially in the thoracic rings, and there is a strong longitudinal substigmatal fold. The head is smooth, pale brown, with the anterior edge of the clypeus, labium and mandibles black; the thoracic shield smooth, broad and colourless; feet pale yellow; stigmata small, round, pale yellow; piliferous spots scarcely perceptible; fine, short hairs chestnut.

The larva changes to pupa in a thick, gummy cocoon, strengthened exteriorly by bits of wood and placed in cells just under the bark, with a thin shell remaining to be broken up by the pupa at the final change, the pupa skin remaining protruded.

The pupa measures 10 mm, slender, light brown, with the usual transverse denticles on the dorsal abdominal segments and a circle of stouter teeth about the abdominal tip ; the clypeus is armed with spine or tooth.

The moths issued this year from May 11 to July 15. It is a pretty species, the sexes differing somewhat in appearance, the female being easily mistaken for that of *acerni*, although smaller.

The male expands 17 mm.; the colour deep black with some metallic scales ; the narrow clothed margins of the wings and heavy discal bar deeper than the apical patch which is more bronze-brown ; fringes concolorous except the anterior third of inner margin which is yellow. Clypeus with white lateral lines ; palpi light orange except the blackish third joint and outer side of second apically ; collar same colour as palpi ; antennæ black, slightly washed with white on outer edge of apical third. The thorax yellow below, black above, with long golden cilia about the insertion of the wings. Abdomen black above, same below, with more or less of golden scales running up on the sides at edges of rings. and on fourth ring giving a narrow band, in some seen faintly on other dorsal rings. Anal tuft ample, black above and laterally at base, below deep reddish orange. Claspers yellow. Legs : coxæ golden, other joints black outwardly, golden inwardly to claws, last pair with middle of tibia and tips of tasal joints ringed with golden ; the inner side of fore tibiæ is light orange ; spurs concolorous with the golden yellow legs.

The female expands 20 mm. General colour the same as male, but differs in having less black at tips of palpi, in having much more golden beneath abdomen, in having the same extending over dorsum so that nearly all the rings are faintly edged. and the fourth with a broad band, and in having no black in the ample caudal tuft which is deep reddish-orange.

I have compared the moth with Henry Edwards's description of *Aegeria* and conclude it is his *Aegeria corni*, although one cannot be positive without comparing the type. He had before him only one male taken in Purgatory Swamp, Mass., and the description is not all that could be wished. My specimens differ slightly from the description and vary considerably, frequently more than some of Mr. Edwards's species differ from one another. I will point out some differences which it seems to me are easily reconciled. He gives expanse of *corni* 15 mm.: the smallest of mine (males) is 15 mm., the largest 18 mm.. average 17 mm. He says, " No bands " Some of mine are scarcely banded after storage in the cabinet a month. He says " spurs light orange." In mine they are not, the only real difference between his descriptions and my moths.

Before our next annual meeting I shall try to compare my moths with the type, and shall take pleasure in reporting the results.

Is the moth an inquiline? It would seem so, yet after much searching I have found only one beetle borer that would probably serve as a forerunner ; this was found in an excrescence of *Acer dasycarpum*. The Aegerian is far more abundant in *Acer saccharinum.*

Aegeria rubristigma, n. s.—Whilst searching in excrescences on the oak for examples of *Aegeria gallivora*, I came upon the present species, which is less common than *gallivora;* it is a perfectly distinct species and apparently undescribed ; hence I propose to describe it under the name given above. One male and one female obtained. Female.—Forewings purple black, with red scales between the veins and the square stigma at end of cell red ; borders of hindwings very narrow, costa reddish : fringes ample, black, yellow at basal third of inner margin of hind pair ; beneath forewings yellow to stigma, which is deep orange, beyond the borders and veins black with reddish between ; hindwings with costa yellow, also anterior third of inner margin. Head all blue-black, with milk-white lines before the eyes ; collar yellow ; palpi with basal joint black, second black except the front margin, which is yellow, as is the whole of the third joint ; the antennæ are wholly black, except the under side of the basal ring which is yellow. Thorax uniform blue-black, with colour extending upon the base of wings ; metathorax golden yellow ; beneath colour as above, with a light yellow almost white spot under the insertion of the wings. Abdomen concolorous with thorax above and below ; the second segment has a narrow dorsal band, the fourth a wide one, extending entirely around the body, and the last a narrow band all golden-yellow ; tuft at end of abdomen concolorous above and below with a line of yellow hairs laterally. Legs blue-black, varied as follows : Fore-coxæ outwardly, fore-tibiæ, all the tarsi, the spurs and a band at the middle and apex of the hind tibiæ yellow ; the tarsi, however, have some dark, scales sometimes appearing faintly banded.

The male agrees with the foregoing except that the abdominal bands are less distinct and the yellow in the caudal is wanting.

Expands 17 mm.

Obtained from Cynips gall on twigs of *Quercus palustris,* collected by my friend, E. E. Bogue, at Sugar Grove, Ohio, and by myself at Central College, Ohio. One imago appeared June 10 and one July 15.

The pupa has the usual form, length 12 mm., armed, clypeal spine flattened to a cutting edge apically ; there is a median ridge on the dorsum of mesothorax and on either side of it a parallel grove.

The pupa cell is excavated in the pithy substance of the gall and lined with silk.

This moth should be compared sufficiently for separation with other species from Quercus galls. It differs from *Hospes* and *Gallivora* as follows: Front blue-black, whilst they have front white : legs black ; they have legs yellow : palpi black and yellow ; they all yellow with mere tip black. *Rubristigma* has red bar ; they black. Compared with *Aegeria querci* from galls on live oak it is twice as large. *Querci* has lemon-yellow lines on side of thorax, antennæ brown, yellowish beneath ; has nearly all the abdominal rings with bands costa lemon-yellow beneath, leg-joints whitish, pectus lemon-yellow ; in all these points *Rubristigma* differs decidedly. The differences are also as striking with *Nicotianæ,* with which Henry Edwards compared *Querci,* a species having a fiery-red discal mark.

ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE—ANNUAL ADDRESS OF THE PRESIDENT.

BY E. A. SCHWARZ.

At the Ann Arbor meeting of our Club, in the year 1885, Prof. John B. Smith proposed as a subject of discussion "How shall we create and foster an interest in the study of Entomology?" In the discussion a rather gloomy view was then generally taken by the members regarding the general lack of interest in entomology in this country, Prof. Riley alone expressing himself hopefully as to the future outlook. As the best means for creating such interest the production of a *popular* compendium of North American insects was recommended, but the discussion only dwelt upon the difficulties in the way of producing a popular and yet valuable work.

Now, no one can deny that within the few years that have elapsed since 1885 a great change has taken place, a change which has been alluded to by others, and among them by Prof. A. J. Cook in his presidential address delivered at the Indianapolis meeting of this Club in 1890. Many new and conscientious workers in the various branches of both pure and applied entomology have appeared; orders or families of insects hitherto sadly neglected have found competent students; the life histories and earlier stages of a multitude of insects have been studied and recorded with a thoroughness and exactitude previously rarely attained; entomological instruction, both of a scientific and practical nature, is now given by competent teachers in many colleges; the increase in popular interest in entomology is manifested in the many collections that have recently been formed by young beginners; and, finally, even the newspapers have ceased to make fun of "bug catchers." In short, the combined work of our entomologists from the time of Say and Harris down to our day begins to bear fruit, and has enforced for entomology that recognition among the other sciences which her importance demands.

An excellent illustration of this change can be found in the records of last year's meeting of our Club, held at Washington. In his admirable address as president of the Club, Prof. Herbert Osborn again proposed the production of a Manual of North American Entomology, but this time not of a popular one to create and foster an interest in the study of entomology, but of a scientific compendium for the use of the advanced student, a work which should embody in a conveniently condensed form all those contributions to general, to systematic or to biologic entomology, which in their totality represent the present state of knowledge of North American insects, and which are now so sadly scattered through the literature. The members of the Club then present greeted the project with applause; no gloomy views regarding its practicability were heard, the only serious objections made being of a business nature. A committee was appointed, which in due time submitted a favourable report. For want of time this report could not be discussed last year, but the committee was instructed to submit a "well-digested scheme one year hence", and I sincerely hope that the proceedings of our present meeting will contribute toward an early realization of this important plan. For my own part I subscribe to every word that has been said in its favour by Prof. Osborn in his address, and by other members during its preliminary discussion. Many of us will have given attention to this subject during the past year, each in his own specialty, as I have myself. And I have more particularly considered in my own thoughts how the collated and combined work hitherto accomplished in North American coleopterology will compare with a certain manual on European Coleoptera, which has done eminent service, and to which I shall refer later.

It is generally supposed that North American coleopterology is in a better, *i. e*, more advanced state to be represented in a compendium, than most other orders, and upon reflection I find this to be the case in some respects, but not so in others. On this subject I have noted down some remarks which I beg leave to present herewith in a condensed form.

In order to study insects we must first collect them, and I have, therefore, to devote a few words to the state of exploration of our country. The history of the entomological exploration of North America has many interesting points which are not generally known, but I cannot possibly review the whole subject, and shall confine myself to the progress made since the foundation of this Club in 1874. The older members of our Club will remember that at that time, or a little previously, Coleoptera from California or even Colorado were to be found only in a few cabinets; to-day the Coleopterous fauna of the Pacific Slope, Colorado, Kansas and some other Western States are in many of our Eastern collections by far better represented than those of Georgia or Maine. The completion of the Southern Pacific Railroad opened for easy exploration a vast extent of territory previously but imperfectly known; coleopterists have not been slow to avail themselves of this opportunity, and an unexpectedly large number of hitherto unknown species have been brought from that region, especially from Arizona. Skilled field coleopterists have been over the lines of all other transcontinental railroads constructed since 1874, including the Canadian Pacific Railroad (opened in 1886), and over most of their branches. In short, the whole country lying west of the Rocky Mountains and east of the Sierra Nevada may be said now to be explored as well as can be expected by entomological travellers or expeditions. This exploration is necessarily more or less superficial, a mere skimming of the surface. What is needed for the region mentioned is the presence of a number of active *resident* specialists; for even the most expert collector is unable during a few weeks' excursion to thoroughly explore even a very small area. He cannot acquire that local knowledge which is necessary to a thorough investigation; he has but little chance for making biological observations, and he cannot possibly keep track of the species appearing in the different seasons of the year. What can be accomplished by the work of resident specialists has been shown of recent years in California, and, thanks to their labours, the fauna of that State is now as thoroughly known as that of Pennsylvania or Virginia.

There is something else needed for the West, viz., a *speedy* exploration wherever possible of those sections where the native flora and fauna are still intact from the inroads of civilization. Faunas and floras of small islands have within the memory of a single generation undergone great changes; native species have disappeared and cosmopolitan species have taken their place. The island of St. Helena is a familiar and often quoted example of this influence of human cultivation, and not long ago one of our botanists complained of the inevitable extermination in the near future of some of the plants peculiar to one of the most interesting faunal regions of the West, viz., the islands off the coast of California. This influence of man not only produces changes on islands of smaller or larger extent, but also affects, though in a much slower way, larger faunal regions. In 1891 I had, in the company of Mr. H. G. Hubbard, an opportunity to visit the more readily accessible parts of the Wasatch Mountains of Utah, and a few days' exploration convinced me that the aboriginal fauna of that range must have been quite different from what we found. This range, once covered with a magnificent coniferous forest, has now been more or less completely denuded in consequence of mining operations; whole mountain sides are now kept bare of any vegetation whatever by snow slides. In the more sheltered portions and on the plateaus a scanty growth of deciduous trees and shrubbery has replaced the conifers; thousands of sheep, which are driven through the canyons up the mountain, make annually a complete sweep of the alpine and subalpine lower plants. It is no wonder under these circumstances that species peculiar to these mountains are now but few in number and rare in specimens, and that there is an undue proportion of species which are evidently immigrants from other regions. Along the base of the mountains irrigation and cultivation have effected a still more radical change and utterly exterminated the native flora and fauna. Even along the old water courses within the irrigated districts the insects have disappeared. Similar conditions prevail all over the West; in the Southwest irrigation and sheep, and in the Northwest the axe of the lumberman, and forest fires are hard and fast at work destroying the original flora and fauna. Of course, there are in the West many square miles of virgin ground left, but if we are desirous of preserving a record of the original fauna, there is need, as I said, of a speedy exploration.

There is still very little known of the Coleopterous fauna of Lower California and more especially of the tropical part of this peninsula. How large a proportion of the Coleoptera of Alaska has been described, or is at least available for study in our cabinets I do not know, but judging from the fact that the Swedish Vega expedition brought home from the northwest coast quite a number of species previously unknown, I presume that much still remains to be investigated in the western part of Alaska and in the interior.

In the country east of the Rocky Mountains the progress of exploration has of course been much more thorough than in the newer west. Since the formation of this Club the faunas of Texas and Florida, hitherto but imperfectly known, have yielded a large number of new forms; the White Mountains of New Hampshire have been very carefully explored, and this mountain range is the only one in North America which may be said to be thoroughly investigated, not only in regard to Coleoptera, but also some other orders. Besides this a large amount of very careful collecting has been done at many points within the Northern, Middle and Western States with a thoroughness which was utterly unknown to the coleopterists of thirty years ago, and which has, I fear, resulted, in some instances, in the extermination of a few choice species. At any rate, it gives us for the first time a correct idea of the fauna of many restricted localities. The results of the most careful local investigations are not recorded; it may be of interest, therefore, to learn that the Coleopterous fauna of what, in my opinion, is the best explored point in North America, viz., the District of Columbia, amounts to upward of 3,200 species.

The absence of resident coleopterists in a large portion of the South, and more especially in Georgia, Alabama, Louisiana, and Arkansas is sorely felt; the high mountains of North Carolina have never been explored coleopterologically; only a small portion of the semitropical region of Florida has been visited by coleopterists; and what little we know of the Coleoptera from the extreme northwest is due to the exertions of European entomologists. A recent Danish writer informs us that twenty-five species is the total of what is known of the Coleopterous fauna of Greenland!

To sum up: I fully believe that if the material of North American Coleoptera now scattered in many collections could be concentrated we would have a very fair representation of our fauna, and this not only in the larger and more conspicuous species, but also in the previously neglected Microcoleoptera even of those groups which have not yet been worked up.

I may add that, thanks to the example and advice given by a few coleopterists, specimens in collections are now generally much more carefully mounted, and, therefore, more readily available for study than was the case some twenty years ago. The old reproach that specimens from American collections are poorly mounted or pinned, and generally in a miserable state of preservation has no longer any force. On the other hand the importance of a more exact and more scientific mode of labelling is slowly becoming recognized by our coleopterists, and still disregarded in some collections which would otherwise possess high scientific value. Improvement and progress in this respect are, however, visible of late years.

That the classification of the North American Coleoptera is more advanced and in a more satisfactory condition than that of any of the other large orders, is almost wholly due to the genius of two men. It was Dr. Leconte who at an early period of his studies recognized that our Coleoptera had to be treated in a monographic or synoptic way, based upon studies independent of the classification of the European fauna. What he accomplished during his lifetime has been ably set forth by others more competent than I His work has been taken up and continued in a masterly way by Dr. Horn, whose numerous contributions to coleopterology during the past twenty-two years are in every respect models of monographic treatment. That his work has not only advanced the knowledge of North American Coleoptera more than the combined work of all previous authors, but also that it has contributed largely to the classification of Coleoptera in general, is universally acknowledged, and I need not dwell here on this point. But what I desire to emphasize here is the eminent practical usefulness of Dr. Horn's descriptive work. There are hundreds of other valuable monographs on Coleoptera and other orders, not to speak of the almost countless descriptions of isolated genera or species. In studying these, how often is the need or necessity felt, even by the most experienced and painstaking student, of examining what is known as the type of the author in order to obtain clearness in regard to a species or genus. In fact a considerable proportion of our more recent entomological literature is filled with the discussion of types and with the results of examinations of typical specimens, not only those of the older, but also of recent authors. Costly journeys to places where types are preserved are the order of the day, and even the finding of such types in a large museum has developed into a science. It would appear, indeed, as if the types were everything, and the published descriptions only of secondary, or of no value whatever. Now, what I mean with regard to the practical usefulness of Dr. Horn's descriptive work is that here this element of uncertainty and ambiguity is eliminated. With admirable acumen and tact characters of structural nature, which are readily understood and unmistakable to the student are here grasped, their relative importance recognized and set forth in the descriptions in a concise way, so as to leave no room for doubt. The types of Dr. Horn's work are not the frail and perishable specimens in his cabinet, but his published descriptions, which cannot be destroyed by museum pest or fire, and which have become the common property of entomological science.

The number of other American contributors to systematic coleopterology has considerably increased since the time our Club was organized, and some work of an excellent character has been produced, but also some work which, for one reason or another, has not always marked a real advance in the knowledge of the family or group treated. Whoever thinks that a useful monograph or synopsis of a family or even of a large genus of Coleoptera can be produced after one or two weeks' study is greatly mistaken, and should not be astonished that his work is accepted with distrust and disfavour on the part of the working coleopterists. But carelessness and superficiality are by no means always the cause of adverse criticism. There are some contributions to systematic coleopterology written with evident and painstaking care and after much study, and containing many valuable observations on classification. Still their value is greatly impaired by a singular defect. Excessive, and, in my humble opinion, unnecessary, multiplication of genera, now the fashion of the day, is no serious drawback to the study of insects. Genera do not exist in nature, their erection is a mere matter of tact and experience, and they can be rejected or accepted by the working entomologist provided that the components of genera, viz., the species, are known. The species is the unit and the element upon which our classification is based, and whatever difficulty or impossibility there is in the definition of the term "species" from the modern scientific standpoint, there is certainly an easy explanation from the practical standpoint. A species is what the consent of the most experieneed specialists considers as such. I am well aware that in many instances such consent cannot be obtained, yet there are comparatively few genera in our fauna where there is dispute or uncertainty regarding specific limits. If this appreciation of what should be considered as a species is not acquired, if slight variations or individual differences are constantly mistaken for and used as specific characters, this defect cannot be remedied by descriptions be they ever so long, nor the use of the most powerful microscope. Even the most careful and often repeated study of papers of this sort is not able to dispel the clouds of doubt and the veil of uncertainty that overhang and obscure all parts of the subject so treated.

There are a few groups of Coleoptera which have never been monographed. With the exception of one, viz., the sub-family Aleocharinæ of the family Staphylinidæ they are of comparatively small extent, but all of such a nature as to render their synoptic treatment a most thankless and by no means inviting task. Their omission, or only partial treatment, would not seriously interfere with the value of a compendium.

The second edition of the Classification of the Coleoptera of North America by Drs. Leconte and Horn shows that a compendium, such as proposed by Prof. Osborn, can be easily prepared as far down as genera are concerned; all that is needed is to make the additions and alterations rendered necessary by subsequent papers. But I fully believe that American coleopterology has now advanced so far that even tables and diagnoses of the species can be given; in short, that it is possible now, if the preparation of the work is entrusted to the able hand of Dr. Horn, to produce a compendium fully equal in completeness, value and usefulness to Ludwig Redtenbacher's well-known Compendium which deservedly obtained a success unparalleled in the history of descriptive entomology. It bears the modest title "Fauna Austriaca [Austrian Fauna].—The Beetles", but is practically a full synopsis of the Coleoptera of North and Middle Europe, with tables of all European genera, and numerous references to the species of Southern Europe. Its influence on the progress of coleopterology cannot be overestimated, and is best illustrated by the fact that the work, although quite a bulky volume, quite expensive, and consisting exclusively of dry scientific descriptive matter, went through three editions during the life time of the author, each edition being fully brought up to date. The third edition, although now almost twenty years old, is still in the hands of every working coleopterist all over the globe. Its success as a scientific work, and as a business enterprise, has rendered possible the publication of a similar work on the Diptera of Europe, an order which at that time was perhaps more neglected in Europe than it is now in North America. I refer to Schiener's well-known "Fauna Austriaca.—The Diptera" which is modelled after Redtenbacher's work.

What is practically a fourth edition of Redtenbacher's work is now being published by Prof. M. Ganglbauer, of Vienna, and embodies, of course, the more recent progress in classification, and also enlarges the geographical scope of the work; but, what is by far more important, it promises to give due and full regard to the biology of Coleoptera. This leads me to indulge in a little speculation as to what role the biology of North American Coleoptera would play in the proposed compendium. I regret to say that I cannot draw here a very roseate picture.

Biology of Coleoptera is a slow science, and has by no means kept equal pace with the progress in the classification of the imago. The cause of this deficiency is to be found not so much in the lack of interest on the part of our coleopterists, but to the many difficulties that surround the subject on all sides, even in the elementary branches of the science. If we except a portion of the Chrysomelidæ, a portion of the Coccinellidæ, a portion of the Dermestidæ, and a few other genera or species, the mere finding of Coleopterous larvæ is a difficult thing, the rearing of the same still more difficult, and the tracing of complete life histories from the egg to the imago state has been successful in comparatively few instances. The investigation of the food habits of imagos and larvæ, which is such a simple thing in Lepidoptera, becomes a complicated subject in Coleoptera. In the description and classification of the larvæ coleopterology encounters difficulties which do not exist in Lepidoptera. Coleopterous larvæ are, almost all of them, of a uniform colour. There is not that infinite variety of various ornaments, such as tubercles, bunches of long and bristly-coloured hair, appendices of various sorts, etc., which are of so great assistance in the description of caterpillars; their distinguishing structural characters are very minute, difficult to observe and to describe, and their relative importance and value have in many families not yet been pointed out.

In brief, the biology of our Coleoptera is yet in its infancy and coleopterology has not yet derived therefrom that benefit which the lepidopterists have obtained from a comparatively full knowledge of the earlier stages and general development. But I may be permitted to state here in defense of the coleopterist that, with all due respect to the many contributions of a purely scientific character, the great progress in the biology of Lepidoptera is in no small measure due to the desire on the part of the mere collector to obtain by breeding fresh imago specimens for their cabinets. This incentive is wholly absent in Coleoptera.

Of our commonest species of Coleoptera we are unable to find the earlier stages, and those larvæ we find commonly cannot be bred to the imago state. There is but little exaggeration in this sentence. But in spite of this difficulty there have been formed within the last twenty years some large collections of Coleopterous larvæ, which is, of course, the elementary and most important step toward a knowledge of them. Thanks to the attention given to this subject by Dr. Riley, there is now at the Agricultural Department in Washington a collection of Coleopterous larvæ which is the more valuable since most species have been actually bred. An idea of the extent of this collection can be formed from a list published some years since in "Insect Life", and enumerating nearly 130 species which could be spared from the duplicates. Since that time the accessions to this collection have been unusually large, not only from the eastern part of the country, but for the first time we find here represented, thanks to the exertion of resident specialists in Coleoptera, quite a number of genera or species peculiar to the Pacific slope. Hardly inferior in extent is the collection of larvæ preserved at the Museum of Comparative Zoölogy, and I have no doubt that good collections are at the laboratories of the Cornell University and at Champaign, Ills., though I have no personal knowledge of them. Finally, I hope that valuable material is accumulating at the various experiment stations. What I said before of collections of imago specimens may be repeated here: if the biological material now scattered in various collections could be concentrated we would see that far more has been accomplished than we are generally inclined to suppose. Still, there is an almost exasperating want of knowledge of the larvæ of just such families or genera the systematic position of which is in doubt. Thus the larva of the South American *Hypocephalus armatus* would throw light, and in all probability fully clear up the affinities of this remarkable and much discussed beetle. In our own fauna, if we had the larvæ of *Cupes* or *Rhyssodes* the uncertainty regarding the affinities of these families would be removed; if we had the larva of the genus *Nicagus* we would at once know whether it is a Lucanid or a Scarabæid.

The life histories of Coleoptera, so far as these are of common importance have generally been well studied and recorded with great thoroughness. The investigations of the life histories of our Blister beetles, the root-feeding Chrysomelidæ, the Elateridæ, the May beetles, are only a few examples of what has been done since the foundation of our Club. How much can be learned by careful study of the natural history of what were supposed to be well-known Coleoptera is illustrated by Dr. Riley's recent discovery of the first larval state of our common Bean and Pea weevils (Bruchidæ), and also by Prof. Forbes's admirable studies in the food-habits of our common Carabidæ and Coccinellidæ.

Outside of economic entomology very little work has been done in the investigation of the full life history of our Coleoptera, except the almost countless little notes that have been published on the food-habits or other habits of both imago and larva, on the mode of work of the latter, time of appearance, length of life, number of annual generations, etc. These notes furnish in their aggregate much valuable, though somewhat fragmentary material for the biology of many species and genera. How difficult it is to trace the full life history of a given species is well illustrated by the Coleopterous Beaver parasite, *Platypsyllus castoris*. Through the exertions of Dr. Riley the most careful investigations were carried on in various parts of the country and at various seasons to fill the gaps existing in the knowledge of the history and earlier stages of this beetle. Our most skilled field observers tried their hands in this investigation, scores of beavers were carefully combed from head to tail, the contents and surroundings of beaver dens, either of a dry, moist or wet nature, were thoroughly sifted. then packed up, shipped to Washington and here again subjected to the closest scrutiny. All of no avail ; our knowledge of the natural history of *Platypsyllus* has not advanced a single step ; even that mysterious object the "ultimate larva" has never been found or seen again, and stands out prominently as a sad example of disconnected solitude.

American contributions towards a classification of Coleopterous larvæ are very few, but we have a large number of scattered descriptions of single species. Some of this descriptive work has been excellently done, but a large proportion of these descriptions, both in scientific and economic literature, leaves much to be desired. There seems to be a notion on the part of some writers that it is a meritorious thing to draw up as quickly as possible and publish a description of any Coleopterous larva. If we examine such descriptions it will be found that they are not of any popular value because the untrained reader cannot understand them anyhow ; nor are they of any scientific value because the student cannot find any tangible points in them. Such writers do not seem to be aware of the fact that there are many Coleopterous larvæ provided with six legs, the body being more or less flattened, the head a little darker and the thoracic segments a little longer than the abdominal segments, which are more or less transversely wrinkled. Quite a number of larvæ also have a Y-shaped mark on the head. Much better descriptions than those just characterized were excusable in bygone times when there was little known of the classification of Coleopterous larvæ, or when what little there had been published was generally not accessible to the American entomologist ; but to-day where, in the works of Perris and Schiœdte, we have safe guides to the classification of Coleopterous larvæ of many families, descriptions of such larvæ should no longer be the result of momentary impulse but of a good deal of study and comparison.

It will take many years of hard work before the biological material accumulated in the collections mentioned above can be adequately worked up, and this work will be the more retarded, in my opinion, because I fully side with those who believe that at the present state of biologic science descriptions of Coleopterous larvæ ought to be accompanied by the most careful and detailed illustrations. But good figures are difficult to obtain. With admiration and envy I look at the splendid figures, unsurpassed in beauty and accuracy, that adorn, and in the true meaning of the word, illustrate, Schiœdte's monumental work, and I lose heart if I compare them with the cheap process figures of the most recent American works. How often have I seen the most splendid and accurate drawings made by our best draftsmen tortured into an irrecognizable mess by this modern process ! I fully comprehend the many practical obstacles in the way of having our entomological publications illustrated with costly plates, but I have often asked myself why it is that we do not return to the trusty lithography or the faithful wood engraving which have illustrated many famous entomological works formerly produced in America. I regret that I am unable to give an answer to this question, beyond expressing the hope that a time will come when again a small amount of good and careful work will be more appreciated than a great deal of quick but much less satisfactory work.

In summing up the present state of the biology of our Coleoptera all I can say is that some good work has been produced, but that much more remains to be done on all sides. It is here, more than in systematic coleopterology, that we need more observations, more study, more work, and more workers.

Let me close my remarks with an appeal for more work and more workers in this field, and let me address this appeal to a class of men who by their training, their knowledge, their facilities for work, are best fitted to render assistance. I mean the entomologists of our Agricultural Experiment Stations. It has been asserted, not only once, but repeatedly, before this Club and elsewhere, that the economic entomologists are too much overburdened with professional duties to do any work in pure science. In reply let me point out that a great deal of the best work in entomology has been the work of love, and not of paid labour ; that a great proportion of the best work in all branches of entomological science has been produced by men in the leisure moments of a busy professional life. Are our Station entomologists more overburdened with duties than a hard working teacher or a hard working physician ? Above all, do not let us forget that the study of insects is no work, but that it is a recreation of the purest kind, a source of the highest pleasure ; and no other science possesses a more powerful and fascinating attraction than our beloved entomology.

SOME BEAUTIFUL NEW BOMBYCIDS FROM THE WEST AND NORTHWEST.

BY B. NEUMOEGEN, NEW YORK.

MELIA, n. gen.

Head small, sunk in prothorax, hairy. Front narrow and hairy. Antennæ plumose. Palpi minimal. Thorax stout and very pilose. Abdomen stout, tapering off.

Primaries oblong, half as broad as long, well rounded at angle. Costa straight, apex rounded. Four submedian nervules, vein 5 apparently issuing out of cross vein. Three subcostal nervules, two of them forking off near apex. Secondaries nearly as broad as long, well rounded at apex. Anal angle well pronounced, like in the Notodontidæ. Median cell weakly connected by cross vein, looking like an open cell on a superficial glance. Three median veins, the fourth being replaced by a small groove or fold, which runs through entire wing from base to anterior margin, thus equally dividing it. Subcostal vein bifid near apex. Two submedian veins.

Legs well developed and extremely pilose, with tibial spines of good size, but covered by the hair. Tarsus, tarsical segments and claws prominent.

The genus is of sombre colour, and a near relative to the European genus Ptilophora, Stph., the antennæ and legs showing it. It has to be placed in our lists after the genus Gluphisia, B. Some of the latter genus likewise show indications of a horizontal fold in the secondaries, as, for instance, *G. rupta*, Hy. Edw.

Melia danbyi, n. sp.

Head, collar and thorax dark gray, powdered with minimal grains of yellow, of which latter tint are the rims of the prothorax and patagiæ. Eyes black. Antennæ gray with miminal yellow granules at base of stem. Abdomen dark gray with thin blackish segmentary lines.

Primaries dark gray, powdered with infinitesimal granules of lighter gray, and tufty at base. Costa dark gray, tipped with blackish colour near apex. Nerves black. A number of transverse undulating lines from costa to inner margin, of brownish black, the t. a. and t. p. lines being more visible than the rest. The t. a. line especially so, with whitish accentuations inwardly, thus forming small whitish spots near costa and inner margin respectively. A small whitish costal spot near apex, and several small similar spots at inner rim of t. p. line.

Secondaries uniformly mouse-gray, somewhat hyaline in median and submedian basal areas. The entire anal margin tufted with lighter gray hair. At anal angle, between the submedian veins, a black blotch with several small white kernels. Slight indications of a transverse undulating line. Nerves brownish, and fringes of both wings brownish.

Below: Head black. Legs and abdomen of dark gray. The former very pilose, the tips of the hair tinted with yellowish gray. Black claws and tarsi, with white segments. Whitish abdominal bands.

Primaries and secondaries mouse-gray with whitish granules. The t. p. line only visible and accentuated by a whitish costal dot, surrounded by black.

Secondaries have two dark curved transverse lines, marked by two irregular, black costal dots. Basal areas of wings and anal margin of secondaries tufted with lighter gray.

Expanse of wings, 38 mm. Length of body, 10 mm.

Habitat: Victoria, B. C. Type, one ♂. Coll., B. Neumoegen.

This insect has been caught at electric light by Mr. W. H. Danby, and I take pleasure in naming it after him.

Hyparpax venus, n. sp.

Head yellowish with rose centre. Antennæ light brown. Eyes black. Collar, thorax, patagiæ, as well as primaries, of beautiful light rose colour. Nerves concolorous. Fringes whitish. Beyond median cell, from costa to inner margin, a transverse white line, slightly bending inwardly at its centre.

Secondaries and nerves white, with a rose coloured marginal line along costa and margin to anal angle. A rose tint along anterior margin, fading towards centre.

Abdomen yellowish-white with rose anal tuft.

Below: Primaries and secondaries of yellowish-white with concolorous nerves and fringes. Costas rose and broad marginal rose tints, especially so in primaries, fading towards centres.

Legs rose coloured. Prominent yellowish-white tibial spines.

Expanse of wings, 30 mm. Length of body, 9 mm.

Habitat: Colorado. Type, ♂. Coll., B. Neumoegen.

This is another of the discoveries of beautiful insects we owe to Mr. D. Bruce. It seems to be a rare species, for Mr. Bruce only caught one last year, and this summer only five specimens, among which one ♀, which, as he writes me, tallies in all details with the ♂ ♂. Its name is warranted by its beauty.

Notodonta descherei, n. sp.

Head gray; prothorax and thorax dark gray and pilose, rimmed with black. Patagiæ dark gray with whitish granules and black rims. Thorax, at abdominal juncture, prominently tufted with black. Antennæ light brown. Abdomen gray, with a light brown covering on first two segments. Legs gray, very hariy, except tarsi, which are black and have white segments and claws.

Primaries dark gray with white apical tinges reaching as far as third median vein. Interspaces of costal and subcostal veins marked by three black dashes, the upper one resting on costa, encircling an irregular white costal spot, the latter being the starting point of a transverse sinuate line of irregular whitish spots, terminating on inner margin near angle with a spot, surrounded by black. The basal field, as well as the median interspaces of a light brown shade. A black basal dash, edged with silvery white along basal portion of submedian vein. Nerves blackish. Fringes dark gray with black dots at nerval intersections. A black terminal line edged with white inwardly.

Secondaries light gray, shading somewhat darker near apex and anal margin, which latter is heavily tufted. A black shade with minimal white granules at anal angle, shading off towards median veins. Fringes and terminal line light gray, turning in anal region into the black colour of anal blotch. Nerves grayish-brown.

Below: Primaries blackish-gray from base to beyond discal cell, shading into lighter tints along anterior margin. Apex whitish, and a whitish costal spot above disk. Slight whitish indications of the transverse line. Terminal line well marked.

Secondaries gray with darker costal field of basal part and dark anal blotches. A suffused transverse white narrow band skirting edge of median cell. Terminal line blackish and prominent.

Expanse of wings, 45 mm. Length of body, 10 mm.

Habitat: Victoria, B. C.

Another of Mr. Danby's handsome captures at electric light. I take pleasure in naming this pretty insect after my lifelong friend, Dr. M. Deschere, of this city.

Halesidota sanguivenosa, n. sp.

Head, prothorax, thorax, patagiæ and abdomen brick red. Collar light yellow with a dividing centre line of yellow. Light yellow also marks the centre line of patagiæ, the sides and abdominal edges of thorax. A faint centre line of yellow on abdomen. Antennæ light brown with yellow dots at stem. Palpi yellow. Eyes black.

Primaries and costa brownish-red, of a lighter tint along anterior margin. All nerves blood red. Fringes, as well as the following maculations in light yellow.

Two transverse lines, a transverse posterior and a subterminal line, the former sinuate. The s. t. line consisting of irregular triangular spots, pointed inwardly, terminating at submedian vein, the t. p. line made up of irregular oblong spots, going right through and resting on inner margin. Irregular horizontal dashes along costa and median vein, a large somewhat triangularly shaped spot covering disk, pointing towards base. Small dots and dashes in basal part of intercellular space, and a basal dash on inner margin.

Secondaries semi-hyaline, of a delicate light yellow, tinged reddish along anal margin. Nerves and fringes concolorous.

Below: Primaries dull brownish-red with a vitreous sheen. All maculations as above and partly transparent.

Secondaries as above, with a prominent costal centre spot of brick red. Yellow segmentary bands on abdomen. Legs yellow, with an outer cover of bright brick red.

Expanse of wings, 31 mm. Length of body, 7 mm.

Habitat: Vancouver Island. Type, ♂. Coll., B. Neumoegen.

Undoubtedly one of the handsomest Halesidotas so far discovered in our fauna. To Mr. Chr. I. Weidt, a young professional collector, belongs the credit of its capture.

PREPARATORY STAGES OF CATOCALA STRETCHII, BEHR.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter, .04 inch, about .03 of an inch high; roundish conoidal, base broad but rounded, striated from base to micropyle, thirty-two striæ on the broadest part, sixteen of which reach the micropyle but a few are emitted just as they reach the circle; with very shallow cross striæ. Colour of micropyle whitish, a broad zone below this of purplish-red, next a narrow whitish zone about half the width of the red zone, then another red zone below the whitish, the last a little less than half the height of the egg. Duration of this period 157 days.

Young larva.—Length, .22 inch; cylindrical, slender, head flattened, the first and second pairs of prolegs atrophid. Colour after feeding, pale green, the head pale reddish-brown, three narrow, faint, dark lines on each side that are apparently purplish-brown, a spot or patch of the same on the centre of each joint ventrally; piliferous spots very small; hairs short, dark. Before eating the colour is dull smoky with a greenish tinge. Duration of this period four days.

After first moult.—Length, .30 inch; shape as before. Pale whitish-green, each side with three pale reddish-purple stripes, separated by stripes of the ground colour, a broken stripe of the purple along the lateral folds; head brown; piliferous spots as before; also the ventral spots. Duration of this period five days.

After second moult.—Length, .40 inch. Colour in stripes; the dorsal pale and with two pale stripes on each side, the lower substigmatal; the pale stripes having a pale outer part with darker centres, the dark slightly ellipsoidal on each joint; the dark stripes with dark edges and slightly paler centres but the contrast not so great as in the pale stripes. The dark part is pale red of a slight purplish-brown shade, the light part slightly creamy white with also a tinge of yellowish in the incissures of the joints. The dark centres of the pale stripes not quite so dark as the dark part of the dark stripes. Over joints 9, 10 and 11 the dorsal stripe is more distinctly white with little of the dark centre, the sides of the posterior part of joint 9 and the anterior part of joint 10 obliquely black shaded; also a little of this on joints 10 and 11; slight traces of this between joints 5 and 6, 6 and 7, and 7 and 8, seen more in intensifying the dark colours at these points. Piliferous spots inconspicuous, hairs jet black; no trace of lateral fringe; venter with dark spots on all the joints except thoracic. Head obscurely striped with the body colours.

One example shows much more of the black shading than the others, having it quite prominent between all the abdominal joints and in the dark parts of the stripes as a shading or staining. Duration of this period seven days.

After third moult.—Length, .70 inch. Striped as before but the striping more delicate, the stripes now showing that they are composed of dots, the dots in the dark stripes being a little darker than the dots forming the light stripes, the darkest dots forming the lines separating the stripes; the pale stripes show a little orange tinting, especially on the incissures; the piliferous spots inconspicuous, orange, the posterior on joints 9 and 12 a little more prominent, a blackish patch from those on 9 back obliquely on to the sides of 10; a small amount, mere trace, of the black back of the posterior dorsals of 12. Head coloured like the body, an anterio-lateral black stripe and an imperfect anterior one. Venter whitish, a large black patch in the centre of each abdominal joint; those of thorax blended into a narrow stripe. The lateral fringes begin to show. Duration of this period seven days.

After fourth moult.—Length, 1.10 inches. Only slightly changed from the preceding stage. Colour delicate whitish lilac; the piliferous spots a little more prominent than before and the fringe more developed though still short; the posterior part of joint 9 elevated between the posterior pair of piliferous spots, carrying these with the elevations, about .02 of an inch above the rest of the dorsum, the elevation orange in the centre, and from here blotches of orange and black extend obliquely down the sides on to the anterior part of 10; top of head with a slight orange tubercular elevation on each side of the centre making the head a little bilobed, a nearly continuous black stripe from the outside of base of tubercle down to the eyes, the rest of the head densely mottled with pale lilac and white; a very slight green tinge over the whole body, especially the venter, which is white with this green tint, the central round black spots on each joint proportionally smaller than before and the thoracic portion only a broken reddish-black stain between the legs; hairs inconspicuous, the upper black, the lower gray. Duration of this period seven days.

After fifth moult.—Length 2.50 inches. Very little change from the preceding stage: varying from a very pale lilac gray to darker, the pale ones having the piliferous spots and the elevation on joint 9 pale Naples yellow, the darker ones only a little darker of the same shade of yellow, the latter with a black dot outwardly posteriorly to each piliferous spot, the black dot inconspicuous in the paler ones. Spiracles black. Very little or no shading of dark on lateral part of 9 on pale forms; head as before.

Mature larva.—Length, 2.50 inches. More robust than at the beginning of this period. Width of head, .15 inch; of joint 2, .25 inch; middle of the body, .35 inch; nearly cylindrical, venter a little flattened and the lateral fringe makes it appear more so than it really is; character of markings about as last described; in the light forms there is little variation in the shade of the light and dark stripes, the general effect being a pale lilac gray. The piliferous spots are very pale, but little darker than the ground colour. The dark stripes, as is usual, are composed of dots varying from a purplish-red to a reddish-black, those on the pale stripes simply averaging lighter, elevated part of the dorsal of 9 very pale orange. Head with the upper part yellow-orange. Venter as before. The dark forms have the greater average of dark dots in the dark stripes, and the ground colour in these stripes is darker, especially at the incissures, making sharp contrast between the light and dark stripes, but the piliferous spots are the same. Duration of this period four days.

Chrysalis.—Length, 1.30 inches; wing and tongue case to posterior part of joint 5, .55 inch; depth through 5, .32 inch; through 4, .33 inch; through 3, .34 inch; through 2, .32 inch; nearly cylindrical, tapering gradually back from 5, anterior part rounded, antenna case extending as far back as the wing case; punctures of abdomen small and shallow; cremaster so blunt and short as scarcely to be called conical, depressed ventrally, corrugated irregularly but mostly longitudinally, ending in a few hooks of varying lengths. Colour dark chestnut-brown, covered with a white bloom. Duration of this period from 44 to 53 days.

Three spun in the upper corner of the box in which they were raised two together in one common cocoon, the rest in the lower part, mostly in the corners and edges just above the dirt, on the sides of the box and among the refuse twigs and leaves where these came against the sides of the box, others among the leaves of the food-plant. The cocoon is thicker and more compact and firm than that of most species, those in the upper corners of the box being smooth inside, firm and mingled with loose web outside.

The eggs from which these larvæ were raised were sent me from

Colton, California, by Mr. G. R. Pilate, and were deposited Oct. 21, 1888. They hatched March 27, 1889, and the last one hatched June 20th, making a total period from egg to imago of 242 days. The food-plant given me by Mr. Pilate was cotton wood or willow. At the time they hatched the willows were just beginning to swell their buds a little. These were given to them and they ate them by boring into them, acting as borers in this stage just as the larvæ of *Ilia* do in oak buds; and some of them continued this boring habit till after the second moult, the young leaves at this time being about half an inch long. The fringe along the sides of the larvæ places this species near *Ilia* instead of with some other species that do not have the fringe; but of this I expect to have something to say in another article.

SYNOPSIS OF THE NORTH AMERICAN SPECIES OF ASTATUS, LATR.

BY WM. J. FOX, PHILADELPHIA.

FEMALES.

1. Marginal cell as long or longer than the first submarginal (if shorter it is scarcely noticeable)........................ 2
Marginal cell always much shorter than the first submarginal.....6
2. Dorsulum rather strongly and closely punctured................3
Dorsulum more or less sparsely punctured 5
3. Entirely black............... ....*unicolor.*
Abdomen red 4
4. Pygidial area long, narrow, a little more than twice longer than it is broad at the base; stigma of wings black............*bicolor.*
Pygidial area of a more triangular form, not more than twice longer than its base is broad; stigma of wings yellowish...*pygidialis.*
5. Metanotum with a well-marked, triangular depression at apex; the length of the marginal cell is fully equal to the first submarginal; pubescence of thorax white.......... ....*occidentalis.*
Metanotum without a well-marked depression at apex (if present at all it is very faint); the length of the marginal cell is a little less than the first submarginal; pubescence of thorax black; abdomen black or red and black...... .... *nubeculus.*

6. Metanotum with coarse, irregular, radiating striations ; antennæ and legs stout. . . . . *nevadicus.*
Metanotum finely sculptured 7
7. Tegulæ testaceous ; metanotum finely granulated. . . . . . . *montanus.*
Tegulæ whitish ; metanotum very finely striated. . . . .*elegans.*

MALES.

1. Marginal cell as long or longer than the first submarginal (if shorter it is scarcely noticeable). 2
Marginal much shorter than the first submarginal 6
2. Entirely black. 3
More or less red. 5
3. Pubescence of thorax black ; forewings, except basal third fuscous ; metanotum strongly reticulated. . . . .*nubeculus (=nigropilosus.)*
Pubescence of thorax white. 4
4. Wings hyaline throughout ; first joint of flagellum fully one-third longer than the second ; metanotum not depressed before apex . . . . *unicolor*
Forewings stained with fuscous medially ; first joint of the flagellum about one-quarter longer than the second ; metanotum more or less depressed before apex. . . . . *occidentalis.*
5. Pubescence of thorax white ; metanotum recticulated. . . . . .*bicolor.*
Pubescence of thorax black. . . . .*nubeculus.*
6. More or less red ; tegulæ whitish ; wings subhyaline. 7
Cæruleus ; wings fuliginous . . . .*cæruleus.*
7. Metanotum very finely granulated . . . .*elegans.*
Metanotum very finely and transversely striated. . . . .*bellus.*

ASTATUS, LATR.

Astatus, Latr. Precis. Caract. gen. Ins., p. 114., 1796.

Astata, Latr. Hist. Nat. gen. et part. des Crust. et Ins. III., p. 336., 1802.

Astatus, Kohl. Verh. Zool.-botan. Gesell. Wien. XXXIV., p. 431, 1885.

1. ASTATUS UNICOLOR, Say.

Astata unicolor, Say. Exped. St. Peter's River II., p. 337, ♀; Smith, Catal. Brit. Mus. Hym. IV., p. 310, pl. VIII., fig. 1., 1856, ♂.
Canada to Texas.

2. ASTATUS OCCIDENTALIS, Cress.

Astata occidentalis, Cr. Proc. Ent. Sect. A. N. S. Phila., 1881, p. III., ♂ ♀.

Resembling closely *nigropilosus*, but is at once distinguished by the white pubesence, and by the marginal cell being fully as long as the first submarginal; the depression on metanotum, apically, is much stronger. Length, 12-14 mm.
Nevada, Montana, Washington.

3. ASTATUS NUBECULUS, Cress.

Astata nubecula, Cr. Proc. Ent. Soc. Phila., p. 466, ♂.

Astata nigropilosa, Cr. Proc. Ent. Sect. A. N. S. Phila., p. IV., 1881, ♂ ♀.
Col., Nev., Cala., Mont., Washington.

4. ASTATUS BICOLOR, Say.

Astata bicolor, Say. West. Quart. Reporter II., No. 1., 1823; Lec. Ed. I., p. 166. ♀ ♂.

Astata rufiventris, Cress. Trans. Amer. Ent. Soc. IV., p. 218. ♀

Astata terminata, Cress. ibid. ♂.

Canada and the entire United States. *A. terminata*, Cress., is a slight variety, having the metanotum a little more strongly roughened.

5. ASTATUS PYGIDIALIS, n. sp. ♀.

Front strongly and rather closely punctured, sparsely so along the inner orbits; vertex very sparsely punctured; the distance between the hind ocelli is almost twice greater than that between these ocelli and the inner eye margins; antennæ rather stout, first joint of the flagellum about one-quarter longer than the second, which is about equal to the third; collar and dorsulum rather strongly and closely punctured; scutellum, except on sides, almost impunctate; metanotum roughened and with irregular, radiating striations or ridges and with a strong medial carina, which extends to the apex where it joins a transverse curved ridge, which bounds the strong pyriform depression at this place, the sides and posterior face of metathorax roughened; legs tolerably stout, the posterior tibiæ and tarsi strongly spinose; abdomen very sparsely punctured; pygidium about twice as long as it is broad at the base, the sculpture appearing squamate. Black; mandibles medially, clypeus medially, scape beneath, tegulæ and legs, rufo-testaceous; abdomen entirely ferruginous, with a somewhat yellowish tinge; head and thorax clothed with tolerably dense, white pubescence; wings subhyaline, the apical portion darker; stigma yellowish; marginal cell a little shorter than the first submarginal, obliquely truncate. Length, 8-10 mm. Three specimens. New Jersey, Texas.

6. ASTATUS NEVADICUS, Cress.

Astata nevadica, Cr. Proc. Ent. Sect. A. N. S., Phila., 1881, p. V. ♀.
Nevada, N. Mex., Montana, Washington.

7. ASTATUS MONTANUS, Cress.

Astata montana, Cr., l. c., p. V. ♀.
Nevada, Col., Mont.

8. ASTATUS ELEGANS, Cress.

Astata elegans, Cr., l. c., p. VI., ♀ ♂.
Nevada, Col., Mont., Washington. This species appears to be closely allied to the *A. stigma* of Europe.

9. ASTATUS BELLUS, Cress.

Astata bella, Cr., l. c., p. VI., ♂.
So. California.

10. ASTATUS CŒRULEUS, Cress.

Astata cærulea, Cr., l. c., p. IV., ♂.
Nevada.

ON EUDRYAS STAE. JOHANNIS, WALK.

BY A. R. GROTE, A. M.

I saw the type of this species in the British Museum and considered it to represent a distinct species, allied to *E. grata.* Prof. Smith says, CAN. ENT., 134, "I have no hesitation in referring the species (?) as a suffused aberrant *grata*." Now the hindwings want the band and are immaculate, hence there is no "suffusion" on the secondaries. The forewings resemble *grata*, but the markings differ. I could see no "suffusion." The specimen seemed larger to me than *grata.* The specimen may be an extraordinary variety of *grata*, but not a "suffused" variety. Prof. Smith says :—"The type is marked 'Taken on the church door at Horsley Downs.'" And further :—"It is probable that in some way the pupa of the insect was transported to England and through the vicissitudes encountered an aberration was produced." This explanation does not seem reasonable to me. I do not know what is meant by "the vicissitudes encountered." Pupæ of *grata* transported to England would probably produce typical *grata*, just as pupæ of other species produce the typical form when they emerge on this side of the water. The voyage could not change a *grata* to a *Stae. Johannis.* I think this is certain. And, now, what did Walker mean by the name ? He evidently supposed the specimen was taken at the St. John's River, Florida, and probably by Doubleday. He did not then believe in the authenticity of the label now attached to the species. Or is the church at Horsley Downs named in honor of St. John ? The specimen is at any rate evidently American, as the genus *Eudryas* is found nowhere else. It is, as it stands, one of the most curious of the uniques in the British Museum collection. The improbability that it should have been taken on a church door in England (?) is very great. That the label might have been wrongly attached, or changed from some other specimen, seems less improbable when we consider the chances of its being so taken. If a variety of *grata*, or a distinct species, it seems likely that our collectors in Florida may throw some light on the subject in the future. If *grata* varies in this manner, the conditions will probably occur again and the variety be produced. It may be even that the specimen represents a South American species unknown to us. As the case stands, it cannot be called a "suffused" variety I should say, and the mystery is certainly not cleared up by the statements of Prof. Smith. We must find other specimens of *Eudryas Stae. Johannis* before we can feel that any certainty in the matter has been secured.

[I find, on reference to the "Clergy List," that Horsly-Down is a parish of Southwark in Surrey, and that the church is named St. John's. I have, therefore, no doubt that Walker named the insect after the church where it was found. That Lepidoptera may become suffused, or altered in coloration, by a voyage across the Atlantic is evident from the fact that, out of ten pupæ of *Vannessa antiopa* recently sent to Englund by Mr. Fletcher, no less than five turned to the remarkable variety *V. Lintneri*. It is very probable that the specimen of *E. Stæ. Johannis* came from the pupa of an *E. grata* transported in some way across the Atlantic. The feminine termination "Stæ" is very singular.—Ed. C. E.]

PHLEGETHONTIUS 5-MACULATUS.

As an illustration of how insects will at times survive what seem to be the most unfavourable conditions, I may state that in October last there was given to me a chrysalid of the Tomato Sphinx, *P. quinquemaculatus*, Harris. Having no convenience for keeping it in a natural condition, I took a bit of cotton batting and made a bed for it on the bottom of my hatchery, which is a paste-board box with a gauze cover. The location of the box is on top of a high book-case, hence it gets the full benefit of the heat of the room during winter, which was sufficient to mature some Platysamias by the 10th of April. On the 16th of May that pupa gave a well developed imago. It was between six and seven o'clock p. m. when it emerged, and by half-past nine it was flying around the box, so I put it in the cyanide bottle; but it was killed too soon, for although the nervures were fully extended, and quite rigid, the membranes for three-fourths of an inch at the points of the front wings had no firmness to keep them apart, and they came together like the ribs of a closed umbrella. Otherwise the specimen was perfect in every respect.

J. Alston Moffat.

A REARING OF MELITTOBIA.

On the 21st September, 1891, on opening a small box of neglected insects, etc., I caught a glimpse of several minute black flies as they flew out. At the time I could not imagine what they were. The next day I collected a lot of pupæ of Tachina flies and enclosed them in tin boxes to transform to imagines, but instead of the perfect fly appearing, the boxes were filled with the same small flies as I had observed issue from the opened box on the day previous, and then, as I remembered having had some of those Tachina puparia in the box, I readily understood whence the flies came. The pupæ from which those little black hyperparasites were bred were taken from the cells of the common Mud-dauber wasp. Afterwards I observed two specimens of this secondary parasite creep from a minute opening in the end of a pinned pupa of the primary Tachina fly which I had taken from a Mud-dauber's cell and put in my cabinet. I mailed specimens of this species to the Department of Agriculture at Washington, where it was identified as *Melittobia pelopaei.* This shows that the species of Melittobia are not exclusively parasitic on Hymenopterous insects, but are sometimes secondary parasites. As Mr. L. O. Howard wrote that the species of Melittobia had heretofore been reared only from Hymenopterous insects, I thought this rearing of *M. pelopaei* from Dipterous puparia might prove of interest.

A. N. Caudell,

Ringo, Cherokee Nation, Indian Territory, U. S.

[Interesting papers on this genus will be found in the Proceedings of the Entomological Society of Washington, Vol. II., No. 2, viz:—"Notes on the genus Melittobia," by W. H. Ashmead (p. 228), and "The habits of Melittobia," by L. O. Howard (p. 224).—Ed. C. E.]

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MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1892.

(Held at Rochester, N. Y., Aug. 17–19, 1892.)

The Rochester meeting of the Club was probably the most interesting, both in attendance and interest shown, that the Club has ever held. The sessions were held in room four of Anderson Hall, University of Rochester, with an average attendance of fifteen. Members registered and received badges as follows:—Dr. J. A. Lintner, Albany, N. Y.; E. A. Schwarz, Dr. C. V. Riley, D. G. Fairchild, W. T. Swingle, M. B. Waite, Wm. H. Ashmead, L. O. Howard, Dr. C. W. Stiles and Erwin F. Smith, Washington, D. C.; Chas. W. Hargitt, Syracuse, N. Y.; Prof. D. S. Kellicott, Columbus, O.; Dr. John B. Smith, New Brunswick, N. J.; Prof. Bèla Krécsy, Kecskemit, Hungary; Dr. E. B. Southwick, New York City; Prof. Herbert Osborn, Ames, Iowa; Rev. Chas. J. S. Bethune, Port Hope, Can.; Prof. F. M. Webster, Wooster, O.; Howard Evarts Weed, Agricultural College, Miss.; Henry G. Hubbard, Detroit, Mich.; P. H. Rolfs, Lake City, Fla.; Miss Edith J. Claypole, Miss Agnes M. Claypole, Akron, O.; Prof. G. H. Perkins, Burlington, Vt.; Prof. Wm. Saunders and James Fletcher, Ottawa, Ont.; O. F. Cook, Clyde, N. Y.; Rev. L. C. Wurtele, Acton, P. Q.; Prof. H. H. Wing, Ithaca, N. Y.

The daily programmes and announcement of the meetings were given in the programmes of the A. A. A. S.

MINUTES.

The Entomological Club of the A. A. A. S. held its first session in room four, Anderson Hall, at 10 a. m., on Aug. 17. Owing to the absence of the President, Mr. J. B. Smith called the meeting to order. On motion of Mr. Howard, the chairman appointed Messrs. Lintner, Bethune and Osborn a committee to arrange the programme for the meeting. The Secretary, Mr. Marlatt, being unable to be present, Mr. Howard Evarts Weed was elected Secretary for the meeting. It being the hour for the calling to order of the general session of the A. A. A. S., an adjournment was taken until 2. p. m.

The Club met at 2 p. m. and was called to order by President Schwarz; twenty members present. The President called attention to the committees appointed at the Washington meeting of the Club who were to report at the present meeting. On motion of Mr. Smith, it was agreed to meet each morning at 9 a. m. and at such other times as would not interfere with the meetings of Section F. Mr. Riley occupied the chair during the reading of the address of the President by E. A. Schwarz, Washington, D. C.

[The address was published in full in the September number of the Canadian Entomologist, pp. 213–224.]

The address was discussed by Messrs. Riley, Smith and Howard as follows :—

Mr. Riley remarked upon the inferiority of modern as compared with older illustrations, one reason for this being the greater ease and rapidity of the illustrations of to-day. A good illustration is a labour of love and a scientific work. In detail illustrations the process method of illustration is satisfactory, whereas in copper plate and engraving the author must supervise the work, this being especially true in wood engraving. A wood engraver is more apt to damage a good drawing than the process methods. The latter have been a great aid to recent writers, who have thus had much advantage, and have been enabled to more fully illustrate their works. Mr. Riley thought that outline drawings were the most satisfactory, as they bring out the details more clearly.

Mr. Smith thought that the illustrations of the future would be largely made from photographs or photo-micrographs. It is now possible to prepare dissections and to have points of structure mounted in such a way as to bring out proper detail, and photographs can be made from these. Some details are thus brought out which otherwise would not be noticed.

Mr. Howard thought that there were two principal reasons for the inferior illustrations of recent writers. First, the artist does not understand how to draw for particular processes, and, second, although good illustrations were used, poor printing made them inferior work, as they required very careful printing and a good quality of paper. By the process methods illustrations are more easily and cheaply made, and thus more are now used.

The Club then adjourned.

THURSDAY, August 18, 1892.

The Club met at 9.30 a. m., President Schwarz in the chair, seventeen members present. The minutes of the first day's proceedings were read and approved.

On motion of Mr. Smith, seconded by Mr. Lintner, the full proceedings of the Club were ordered to be published in the CANADIAN ENTOMOLOGIST, and an abstract of the proceedings in "Insect Life."

At the Washington meeting of the Club the Secretary was asked to obtain as full minutes of the former meetings of the Club as possible, to be preserved in permanent form. A bill was presented for some of the back numbers of "Entomologica Americana" containing the proceedings, and Mr. Smith stated that he would see that the bill was paid. Mr. Fletcher asked how the small expenses of the Club were met, whereupon several of the former secretaries of the Club stated that these bills were paid by the Secretary. Mr. Kellicott thought that a law ought to be passed providing for the payment of the few necessary expenses of the Club. He was in favor of an assessment, as next year the Club should have an especially good programme.

Mr. Smith objected to an assessment as this was not done by other clubs connected with the A. A. A. S., and most of the expenses were paid for by the Association.

Mr. Osborn objected to an assessment, in that it was not known just who were members of the Club, the membership varying from year to year according to the attendance at the Association.

On motion of Mr. Lintner hereafter the Secretary is empowered to meet the necessary expenses of the Club each year, and present a bill for the same at a future meeting.

On motion of Mr. Smith the President was empowered to appoint a committee to nominate the officers of the Club for the ensuing year. The President appointed Messrs. Fletcher, Osborn and Smith.

Mr. Kellicott then exhibited specimens of pine twigs damaged by *Retinia comstockiana*. Mr. Southwick stated that this insect, so called, was common in Central Park, but a comparison of some specimens which he had with some at Washington had shown them to be a different species.

The following paper was then read:—

PREPARATORY STAGES OF CALOTHYSANIS AMATURARIA.

BY D. S. KELLICOTT.

The preparatory stages of this pretty Phalenid are not given in Packard's "Monograph of the Geometrid Moths", nor cited by Henry Edwards in his "Catalogue of the Preparatory Stages of N. A. Lepidoptera"; and, since they differ in some regards from the general characters of the caterpillars of the genus as given by Guenée, I have drawn up a brief account of larva and pupa.

The food plant at Columbus is *Polygonum dumetorum*, on which it was found in abundance during July and the first week in August.

Larva, 25 mm., long slender, cylindrical, with the last ring slightly swollen, and the first abdominal very much so, its diameter equaling twice that of the next ring. In ground colour there are two varieties: one deep brown or black, the other reddish or light brown. The skin under a lens exhibits paler lines and stripes made by whitish dots. Colour beneath similar to that above, except that the whitish stripes are plainer. The head is small, concolorous, with a white line on either side of the occiput extending on the prothorax; on the front there are four faint white longitudinal lines. On the 2nd, 3rd, 4th and 5th abdominal rings there is a pale lateral stripe, having three white curved lines on each, so arranged as to give the appearance of a slender stem twining about a rod. There are a few whitish dashes on sides of thorax; legs concolorous.

The larva clings to the smooth stems by its claspers, head downwards and body curved like an inverted clothes-hook. When disturbed it springs from its support to the ground, and quickly wriggles itself under cover. Its behaviour when walking is singularly hesitating and unsteady; after each step it lifts its body and explores right and left for danger before venturing another advance. When in this attitude its remarkably swollen first abdominal ring reminds one of a miniature cobra.

The pupa is light in colour, somewhat swollen below; the slender pointed abdomen tipped with black ends in a strong triangular piece edged with hooklets; the hind shield is triangular, with four tubercles between the base of the antennal covers and with the clypeal apex bilobed. Length, 12 mm.

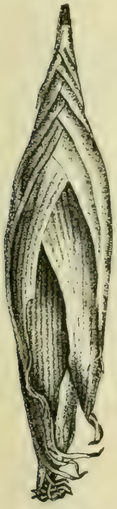
The pupa is sustained among the herbage by a few silken threads, which are the merest shadow of a cocoon. Pupa July 26, imago Aug. 1.

Mr. Webster followed with a paper on

INSECTS REARED FROM GALLS ON MUHLENBERGIA MEXICANA.

BY F. M. WEBSTER.

Eight years ago, in Indiana, I found a gall on this grass that had somewhat the appearance of a diminutive ear of corn with the husks, but more pointed and minus the silk. The husks (I can find no better term for them) were imbricated and pointed, being placed regularly, one over the other, leaving the junctures along the margins. In this gall I found a pupa or, as seems now more probable, a puparium, but reared no insect therefrom. The past spring, Prof. L. H. McFadden, of Westerville, Ohio, kindly sent me a number of these galls, from which, and the stems to which they were attached, I reared the following species:—



Muhlenbergia Mexicana Gall.

1st. Several specimens of an *Oscinid.* 2nd. A *Pteromalid.* 3rd. A *Eurytomid.* 4th. A great number of *Lasioptera*, probably the author of the gall. 5th. Numerous examples of a species of *Polygnotus*, probably a parasite on the Lasioptera. 6th. Specimens of a species of *Eupelmus* that might have come from eggs of Orthoptera, which had been placed in the gall by the parent, or from the puparia of a *Chlorops*, of which I reared no adults.

Thus, from a single species of gall, with a few inches of the stems to which they were attached, were reared six species, with proof of their having contained the seventh, while another, the eighth, had used it as a nidus.

Replying to a question by Mr. Lintner, Mr. Webster stated that it was possible that all the species named did not emerge from one gall, as there were about twelve galls in the breeding jar, but all from the same locality. It was not known how many came from a single gall, or how many from any particular gall. He also remarked upon the recent researches of Mr. Enock in regard to the Hessian Fly, who found that the breast bone of the larvæ was used in turning around within the puparium.

Mr. Smith remarked that in all species of Cecidomyia which he had reared the larvæ turned, but he did not see the necessity of using the breast bone.

Mr. Webster asked if there were not Cecidomyidæ without a breast bone, and thought that if this could be ascertained the question of its use in turning would be settled.

Mr. Kellicott stated that all Cecidomyidæ turn in their burrows throughout their lives, those with strong breast bone turning about quite freely.

Mr. Webster stated that he had observed thin, almost transparent, empty cases projecting from the apexes of the galls, and also found them in the bottom of the breeding jar. These he took to be the cases of the pupæ, and similar to those observed in connection with the wheat midge. Their presence, in this case, implied that enclosed in these the insect made its way out of the coarctate larval skin, and to the outside of the gall, before the imago emerged. He also stated that it would be interesting to verify the statements of Mr. Enock as to the use of the breast bone or anchor-process in the turning of the larva within the coarctate skin.

As few of the members of the Club had seen Mr. Enock's paper, he would make some transcripts from it which would explain his meaning :— * * * " Anyone who will take the trouble to carefully examine, under the microscope, the *true* larva (by this I mean the larva in its first or *feeding* stage) will at once see that it does not possess any anchor-process at all ; and it is not until the *final* larval stage, when the larva is securely sealed up within the puparium or coarctate larva, or second larval stage, that the anchor-process is developed and utilized in the most wonderful manner." [Enock's Life-history of Hessian Fly, Trans. Ent. Soc. Lond., 1891, Pt. 2, (June) p. 336.]

" Though my endeavours to catch a larva in the act of turning round were not successful, I made some valuable observations from the contortions of the disturbed larvæ, the most important being that, by a powerful contraction of the muscles attached to the lower part of the anchor-process, the larva was enabled to draw the apparatus in at the base until it was at right angles to the normal position ; the head, too, was drawn *quite* in, so that the forked end of the anchor-process projected to its fullest extent, and whilst in this naked condition it is thrust into the inside walls of the coarctate larva, the muscles are relaxed, and the ventral surface brought into contact with the inside ventral surface of the coarctate larva. Then other muscles appear to move a portion of the dorsal surface of the body downwards and round towards the bottom or head-end of the coarctate larva ; the tips are then withdrawn, the base contracted again, and a hold taken by the tips being driven in a little higher up; again the muscles bring a tiny portion of the body further round and down, and so this leverage goes on until the larva has completed its task, reversed its position, and rests with its head *up* and the anchor-process *outwards;* the spines on the skin of the larva, all of which point down toward the base, assist it materially in obtaining a firm hold on the inside of the coarctate larva, preventing it from slipping back." (Loc. Cit., p. 339.)

Mr. Lintner asked if the Cecidomyid on choke cherry has been described. Mr. Kellicott thought that the species had been described by Riley, but Mr. Osborn stated that he had had it under observation for four years, and so far as he knew no description of the species had been published.

Mr. Webster stated that he would send specimens of the galls on *Muhlenbergia Mexicana* to any members of the Club who so requested. He also stated that he had reared another species of *Lasioptera* from small, black, orbicular mines on the leaves of a species of Solidago, probably *S. lanceolata.* The species was very small and the larvæ were leaf miners.

Mr. Smith stated that he had seen the work of this species in New York, but he had mistaken it for fungus attack.

Mr. Stiles then made some remarks upon "A Cutaneous Disease of Cattle Caused by an Arachnoid." (This paper will be published in the next number of the C. E.)

In reply to a question, Mr. Stiles stated that this parasite was found as far west as Illinois and in many of the southwestern states. It shows itself on living animals by small lumps upon the skin, and after a time the hair dies at the place of attack. These, like most animal parasites, are only with great difficulty transported from one animal to another. There is a similarity in the species found upon the dog to that found upon the pig. It is hardly possible to mistake these parasites for larval forms, on account of the alomers upon the abdomen.

As the Section of Biology was in session, the Club adjourned until the close of that Section.

The Club met again at 12.15, twelve members present.

Mr. Riley read a paper upon *Galeruca xanthomelæna* polygoneutic at Washington, which will be published hereafter.

Mr. Smith followed with a paper on *Galeruca xanthomelæna* monogoneutic at New Brunswick, New Jersey.

THE ELM LEAF BEETLE.

(GALERUCA XANTHOMELÆNA, Schrank.)

BY JOHN B. SMITH, SC. D.

My first practical acquaintance with this species began at New Brunswick, N. J., in the spring of 1889. In the Rutgers College campus there are a considerable number of elms, many of them grand old trees, which for several seasons in succession and up to 1888 had been defoliated by *Galeruca xanthomelæna*, larva and imago. A double row of young trees, many of them elms, extends from the College campus to the Theological Seminary, a distance of about 280 yards, and at the beginning of this row, most distant from the Seminary, the Experiment Station building is situated. There are also a considerable number of elms among the other shade trees in this part of the city. It was my intention to protect the trees in and near the College campus, and near the Experiment Station, from injury; and, to obtain accurate data for a full history of the species, I noted the dates of the principal occurrences in the life of the insect. According to these notes, the hibernating beetles began appearing in 1889 about the middle of April, very gradually increasing in number to the beginning of May, when they became more plentiful. Eggs were first noticed May 12, giving larvæ May 24. The details of the destructive measures adopted are immaterial here, and are published in my Report for 1889. June 28 nearly all the beetles of the hibernating brood had disappeared, and after July 3 no more were seen. At this time all eggs were hatched. July 5th pupation was quite general, and imagos of the summer brood were developing in numbers July 15. There was a distinct period of a week or ten days during which no beetles could be found, and at that time no unhatched eggs were on the trees. The watch had been close, and I was positive that at the time the last of the hibernating insects had disappeared, the larvæ from the first lot of eggs laid were no farther advanced than full fed and ready for pupation. After the last days of June there were no egg masses to be found on the trees, and by the middle of August the beetles had all disappeared. I felt positive of my results, and published as a fact that the species was single brooded at New Brunswick. This was contrary to all that had been previously written; but in no published accounts were details of actual observations given. I repeated my observations in 1890 and 1891, and presented them at the Washington meeting of the Club. Dr. Riley felt quite certain that I was mistaken, though he could not question my observations, while

Dr. Lintner expressed surprise that the beetles should go into winter quarters in midsummer, and yet more that they should feed for so long a time previously. To settle the matter, if possible, I repeated my observations during the present season, while Dr. Riley carried on a series of observations at Washington, D. C. Dr. Riley, in *Science* No. 492 for July 8, 1892, records the facts that he then had imagos of a summer brood, and that these imagos had oviposited June 28. In a letter dated July 27, he informed me that the larvæ from these eggs had pupated. It is thus positively settled, that at Washington, D. C., there are two broods at least of this insect. My observations at New Brunswick gave an opposite result.

The season was rather later than that of 1889, and I saw no trace of beetles until May 17, and no beetles until May 19. The elms were at this time in full leaf, and began to show the characteristic little holes eaten by the insects. Eggs were first observed May 29, on a small tree, every part of which I could readily scan, and I selected this tree, which was a prime favourite with the insects, for special observation, while I also examined daily the trees in front of the Experiment Station building, the lower branches of which were within easy reach. Dissections made at this time showed that the ovaries of all the females were fully distended, each containing a considerable number of mature eggs, so many, indeed, that it was impossible to get out an ovary entire. The males, when examined, showed rigid, fully-developed testes, which were easily found and removed. The first batch of eggs gave larvæ June 6, and oviposition continued to June 20th, or perhaps a little later. The hibernating beetles gradually lessened in number, and had disappeared entirely June 30. On June 29, I found the first pupa, and on that day collected all the unhatched egg clusters I could find—a very few only. One of these clusters gave larvæ July 1, and all the others failed to hatch. During the first days of July, I gathered about 200 pupæ or larvæ ready for pupation, and beetles began appearing July 8 in the open air, as well as in my jars. There were then on the trees at this date larvæ of all sizes, pupæ and beetles of the summer brood, but *no* egg masses. The beetles in my breeding jars were fed until August 1, at which date all refused to feed further. I had noticed, a few days previously an indisposition to feed among some of the older beetles, and had noted, too, an unusual accumulation of excrement at the bottom of the jar. I found, later, that the last thing done by the beetles before retiring to winter quarters is to empty the entire digestive tract. During the three weeks or more that the beetles were in my possession, I did not notice a single copulation, nor did I get an egg mass. Observations outdoors were to the same effect ; not a copulation ; not an egg-mass. On the new shoots put out by the trees early in August, there are now—the 13th—plenty of beetles, but neither eggs nor larvæ. When I observed this disposition to cease feeding, I dissected a number of the beetles, and in all of them I found the sexual structures undeveloped. The ovaries were minute, and could only be found by securing the large vagina to which they were attached. In the male it was almost impossible to get the testes entire, as they were mere empty tubules, which tore with the slightest strain. A number of newly-hatched beetles were secured and dissected, with the same results. Then a collection was made, selecting those with fully distended abdomen. In none was there more than a slight development of the ovaries, while in all, the digestive tract was gorged with food, and fat globules and masses were forming. I observed also that on the leaves some beetles had discharged long strings of excrement, and they were beginning to appear on the windows of my laboratory and in my house. I accepted this as an indication of a desire for retirement, and as I knew that the bell tower on the main college building was a favourite resort, I sent my assistant to investigate it, August 8. He brought back a vial filled with beetles, and reported that in a rubbish heap on the floor, covered by an old board, the beetles were to be found in large numbers. The bell tower was dark enough to make the use of a lantern necessary, and as there was no other explanation of their presence there in such large numbers, I feel justified in assuming that these beetles were in winter quarters. A number of these specimens were dissected, and in all of them the most prominent feature was the great mass of fatty tissue stored in the abdominal cavity. In all of them the entire digestive tract was free from food or excreta, and in all, the sexual organs were undeveloped.

I consider it positively proved that there is only one generation of this species annually at New Brunswick, N. J. The life of an individual beetle may extend from early in July of one year to well along in June of the following year, and the three weeks feeding time in summer is necessary to enable the insects to store a sufficient quantity of fatty tissue to help them through the nine months of lethargy. The feeding in early spring is again necessary to mature the sexual organs and develop the eggs in the ovaries of the female.

Mr. Riley accepted the facts brought forth by Mr. Smith, and remarked on the statement that the latter had found the ovaries more or less developed in some individuals. He had no doubt but that the species was normally single brooded at New Brunswick. This year the beetles had appeared at New Brunswick two weeks later than last year, which showed that the time of appearance varies greatly. One curious fact brought forth was that the beetles appeared at the same time as at Washington. He remarked also on the fact that during the month of June at New Brunswick there was no evidence of the development of larvæ, which was not the case at Washington. Life is quicker in the more northern regions, and under such conditions acceleration might be expected which was not the case with this species. There is a difference between the life at New Brunswick and that at Washington, and somewhere between these two places there must be a dividing line. Such cases of peculiar characteristics may be explained by heredity. Acquired characters which are beneficial have fixed themselves upon the species, and this, no doubt, accounts for the single or double broodedness of this or any other species.

Mr. Smith called attention to the fact that the observations recorded in the present paper were made in 1889 and the present year, while the observations of '90 and '91 were reported in the proceedings of the Club last year.

Mr. Southwick stated that in New York City spraying for this species was begun about the last of May and that he thought the species was there two, or perhaps three brooded, although Mr. Beutenmeuller of the American Museum has so far noticed but one brood.

In reply to a question by Mr. Lintner, Mr. Riley stated that at Washington the greater part of the second brood of beetles hibernated, although some doubtless laid eggs for a third generation. They disappear in August at Washington at the same time the first brood disappears at New Brunswick.

Mr. Schwarz called attention to the fact that there was a vast difference between the climate of Washington and New Brunswick, which difference he had especially noticed in the coleopterous fauna of these two places. An important investigation in this regard would be the behaviour of the species in the latitude of Baltimore and Philadelphia. The first brood did more damage at New Brunswick than did the same brood at Washington. In Washington it is the second brood that does the most damage, this brood being much more numerous.

Mr. Smith stated that as much difference as is noticed between the fauna of Washington and New Brunswick was also noticed in New Jersey itself between the red shale and the sandy plains regions, while many peculiar forms were found in the hilly north.

Mr. Riley thought that by an exchange of specimens between Washington and New Brunswick it could be easily proved that the single or double broodedness of the species was an acquired habit. He was strongly of the opinion that those received at Washington from New Brunswick would remain single brooded irrespective of climate, while those received at New Brunswick from Washington would be double brooded there.

Mr. Lintner asked if this matter of heredity was not the same in the difference noted between the thirteen and seventeen year Cicada.

Mr. Riley thought that this was the case, the seventeen year Cicada being a northern, and the thirteen year Cicada being a southern species.

In reply to a question, Mr. Smith stated that most of the larger Bombycids *(Saturniidæ)* were double brooded in New Jersey.

The Club then adjourned until the afternoon, immediately after the adjournment of Section F.

The afternoon session was called to order by President Schwarz at 4.15, eleven members present.

Mr. Hubbard read the following paper:—

THE INHABITANTS OF A FUNGUS.

BY HENRY G. HUBBARD.

In the forest-clad portions of the Pacific Coast Range, from the Columbia River northwards into British Columbia, there are frequently seen on the trunks of pine trees which have been injured and blackened by fire, small white fungi almost globular, or slightly flattened and kidney-shaped, varying much in size, but frequently attaining the dimensions of a pigeon's egg. This fungus, kindly determined for Mr. E. A. Schwarz and myself by Prof. Galloway, is *Cryptoporus (Polyporus) volvatus*, Peck., var. *obvolutus*, Peck. It is very tough and leathery, and is remarkable for the extension of the pileus, which forms a thick coriaceous veil, covering the hymeneal surface below, and entirely enclosing it in a cavity which retains the spores as they fall. A small aperture in the veil, less than one fourth of an inch in diameter, penetrates the cavity from beneath. This opening is never in the centre of the underside, but is placed near the base of the fungus ; often so close to the bark of the tree as to escape notice. It gives ingress to a number of bark insects, and these visitors, it may readily be believed, play an important part in the dissemination of the spores and the propagation of this fungus, carrying the fructifying germs in their wanderings from the storehouse of the fungus into direct contact with the inner layers of the bark in which the mycelium lives and thrives. Other insects gaining an entrance by the same opening feed upon the substance of the fungus, and in process of time entirely disintegrate and destroy it, but probably in the process of destruction assist or hasten the ripening of the spores. If the full history of this fungus and its insect fauna could be written, many facts of great inteiest would undoubtedy be evolved, and it could perhaps be shown that we have in this cryptogam a peculiar structure adapted to the dissemination of the spores by insect agency, and analogous to the contrivances found in many flowering plants for the ensuring of cross-fertilization, or the economical distribution of pollen. Unfortunately, our acquaintance with this little cosmos is limited to a few desultory observations made in the field during a collecting trip to the northwest coast and the mountains of British Columbia, along the line of the Canadian Pacific Railway, during the months of May and June of the present year. Some of the insects observed are new to science or remain undetermined, and imagos were not bred from the larvæ found in the fungus. My present purpose in presenting these incomplete and imperfect notes is to call attention to an interesting association of insects that will well repay further study, and to stimulate further researches into the study of the inter-dependence of insects and fungi.

An entomologist accustomed to collect insects in our eastern woods will remark with surprise the comparative poverty of the bark fauna in the magnificent forests of the Pacific Coast. This is due partly to the thinness and tightness of the bark in many western conifers, and partly to the humidity of the climate, which favours the rapid growth of fungi, and these in fallen trunks quickly cement the bark to the wood. It is comparatively rare to find in these forests a log from which large pieces of bark can be readily removed, and which therefore swarms with bark insects as do logs of oak, elm and pine in the East. The bark insects of that region must find a welcome and often a timely refuge in the dark cavity of the Cryptoporous fungus, and as the plant is abundant on the tree trunks throughout extensive districts that have been overrun by fire, it may readily be believed that this plant is an important factor in the distribution of certain species of Coleoptera. Thus I found lurking in this fungus *Cucujus clavipes*, a beetle that is usually rather fastidious in the selection of its abiding place, and which in regions where the basswood, with its loose, thin layers of inner bark, flourishes, will rarely be found elsewhere than in dead logs of this tree. The ubiquitous species of Trogosita are frequent visitors, as might be expected from their predatory habits, and other members of the family, as *Temnochila virescens*, *Peltis* and *Calitys*, were also seen, and in their company the tenebrionid, *Phellopsis porcata*. These, however, are genera which affect the neighborhood of coriaceous bark fungi everywhere, and their presence in this society is quite a matter of course. The rare tenebrionid, *Bius estriatus*, of which a single pair, presumably male and female, was captured in the cavity of one of these fungi, would seem to be a casual visitor only, as its attenuated, cylindrical form is adapted to threading the galleries of Scolytidæ and other bark-boring insects. Other insects, which for want of better knowledge may also be considered intruders, were an undescribed species of *Odontosphindus* in the imago, and a considerable number of unknown but probably predatory larvæ, including that of *Trogosita* and a clerid, which in the present state of our knowledge of coleopterous larvæ it would be useless to examine.

Aradus debilis, Uhler, an extremely thin and flattened hemipteron, swarms in and about the fungus, and evidently finds the cavity a favourable place of deposit for its eggs. A multitude of its young heaved and tumbled the dust within nearly every fungus. All ages were represented there, but the adult bugs seem to prefer the heat and warmth of the sun, and are found on the bark of conifers infested with the fungus. Their bodies, especially when immature, are particularly well adapted to transport the spores of a fungus. Everything in the nature of dust clings to them, and I have no doubt they constitute one of the most reliable propagators of the plant.

Perhaps the most interesting of the inhabitants is the Nitidulid beetle *Epuræa monogama*, discovered by Crotch, and described by him in 1874. He says of it: " Found in Vancouver and throughout the Sierra Nevada in the small white globular fungus which occurs on dead pines. This will be found to have a hole underneath, and if carefully detached a pair of the above insects will generally be found, unless a marauding *Trogosita* has taken possession."* My experience was that the "marauding *Trogosita*" frequently had taken possession, so that the monogamous *Epuræa* was by no means as abundant as I could have wished, for this beetle has, I think, not been seen since Crotch's time. It is a giant of its genus, being nearly equal to *Phenolia grossa* in size, and its colour is so dark and lustrous a brown as to be almost piceus. Notwithstanding its large size and conspicuous contrast in colour with the dead white of the fungus, it is a most difficult insect to discover, by reason of the facility with which its spine-clad body attracts and retains the white dust or spores of the fungus. This gives it perfect concealment in its home within the cavity of the fungus, and when abroad and denuded of its coating of dust, its dark colour harmonizing with the charred bark of the pine tree renders it almost invisible. On the 7th of June, at North Bend, in the Fraser River canon of B. C., I found the beetle occasionally present in fungi which had recently matured and were giving off spores, and always in pairs, as indicated by Crotch. Old devitalized fungi, or those already occupied by other insects, have no attraction for this beetle. Its larva was much more common, and undoubtedly the adult beetles become abundant later in the season. The full-grown larva is half an inch long, and is a very striking object. It is always coated heavily with dust and spores, and when at rest is almost invisible, but when in motion the segments part at the sutures, showing the pale pink colour of the body, and the animal looks like a moving necklace of pearls. It feeds only upon the spores, and the cavities of the fungi occupied by them never show any signs of having been gnawed or eaten on the sides.

Another beetle, *Platydema oregonense*, was very common in the cavities of the Cryptoporus at North Bend. It is one of the largest species of the genus, and several of them crowded into one small fungus must have found themselves rather cramped for room. It is not likely that the *Platydema* is dependent on the Cryptoporus for its living. Our eastern species of the genus are indiscriminate feeders upon many kinds of fungi, although they are usually associated with the tougher coriaceous sorts. The larva of *P. oregonense* was found commonly with the imagos, occupying the natural cavity or eating holes in the hemispherical upper portion of the pileus. Whenever the larva was present in the cavity of the fungus, the latter was always more or less filled with a loose tangle of brown filaments resembling hair. The nature and origin of these filaments has not been satisfactorily made out. Peck, in his description of the fungus, refers to them as if he considered them a product of the plant. He says: "It is not unusual to find little heaps, or even masses of spores retained within the veil. These heaps of spores are generally permeated by minute filaments, which apparently aid in holding the spores together." † Observe that the author speaks of them as generally present, leaving it to be inferred that they are in some cases absent. This accords with my observations. Many of the fungi having matured and become dry retain the tangles of filaments, in which also the cast skins of the *Platydema* larvæ may be found suspended. Other specimens can easily be found which have never been occupied by this insect, and contain no filaments. Moreover, this fungus is not the only one exhibiting a similar connection between a *Platydema* and these hair-like filaments. I can recall instances in which artificial cavities made by boletophagous larvæ in the pileus of some of our eastern fungi were similarly filled with filaments, among which the larvæ of a *Platydema* passed actively back and forth. I am, in fact, of the opinion that these filaments are closely connected in some unexplained way with this beetle. If not produced directly by the *Platydema* larvæ itself, they may be a separate fungus engendered by its debris. In any case they certainly serve a purpose very useful to the active larva in providing it with a convenient scaffolding on which its lithe, elongated and exceedingly slippery body is securely supported, and by means of which it can climb about and reach any part of the interior of the cavity, the walls of which it is engaged in eating away.

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*Trans. Amer. Ent. Soc , Vol. V., 1874, p. 76–77.

It remains to mention a few other insects which attack the substance of the fungus, burrowing into the spongy pileus and piercing holes innumerable in its leathery walls, ultimately disintegrating and destroying it. These are a species of Cis or Ennearthron, and two lepidopterous larvæ which were not studied and remain entirely unknown. My field notes merely state that one of these is a larva nearly an inch long, living in the hymeneal cavity and filling it with web. The second species is a shorter and thicker larva, which eats its way into the solid base and thick upper portions of the pileus, entirely destroying the whole structure. Three or four of these larvæ are found in one large specimen of the fungus.

The work of the Cisid and its larva is too well known to require a detailed description. The beetle occupies in great numbers the cavities and burrows made by larger insects, and feeds indiscriminately upon every part of the plant, while its little white larvæ bury themselves deep in the tough and spongy interior, gradually reducing it to powder. Under the combined attacks of the adult *Cis* and its larva the fungus becomes a thin, dry shell, tattered and riddled with holes. Or its hold on the tree trunk being undermined, it is beaten to the ground by rains, and becoming water-soaked is abandoned to the snails, poduras and scolopenders.

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† Bulletin Torrey Botanical Club, Vol. VII., 1880, p. 102.

LIST OF INSECTS IN CRYPTOPOROUS VOLVATUS, VAR. OBVOLUTUS, PECK.

Cucujus clavipes, var. *puniceus*, Mann. Predatory (?) visitor.

Trogosita, sp. not determined, and larva. Predatory visitor.

Temnochila virescens. Predatory visitor.

Peltis Pippingskoeldi, Mann., and *ferruginea*, Linn. Predatory visitors.

Calitys scabra, Thunb. Predatory visitor.

Bius estriatus, Lec. Probably a fungus eater.

Phellopsis obcordata, var. *porcata*, Lec. Fungus eater.

Odontosphindus, n. sp. Fungus eater.

Epuræa monogama, Cr., and larva. Feeding on spores.

Platydema oregonense, Lec., and larva. Feeding on pileus.

Ennearthron, n. sp., larva and pupa. Feeding on the fungus.

Araclus debilis, in all stages. Predatory (?), breeding in the fungus.

Two species of lepidopterous larvæ, undetermined. Feeding on the fungus.

Unknown coleopterous larvæ of several species. Probably predatory.

In reply to a question from Mr. Weed, Mr. Hubbard stated that no dipterous larvæ were noticed, and Mr. Schwarz stated that the fungus was doubtless too dry for the larvæ of this order.

Replying to a question by Mr. Ashmead, Mr. Hubbard stated that he thought a very similar fungus was to be found upon pine logs in the South.

Mr. Schwarz hoped that this paper would bring forth other investigations of a similar character showing the intimate relations of insects and fungi.

Mr. Riley then read a paper on "The American Bean Weevil," which will be published hereafter.

In reply to a question by Mr. Fletcher, Mr. Riley stated that this species could not be definitely stated to be of American origin.

Mr. Lintner stated that Say's description of *Bruchus obsoletus* was very general, and Dr. Horn only claimed that the description "fits the species fairly well." In deference to the opinion of some of our coleopterists who thought that the name *obsoletus* should be retained, Mr. Lintner had used this name in his seventh report. Mr. Lintner also stated that he considered the species a native of Europe or Asia, probably the latter.

Mr. Schwarz thought that Say was not always correct in regard to the food plants upon which he states insects are found.

Mr. Smith thought that descriptions which fit even fairly well must be accepted, for if this was not done about ninety five per cent. of the descriptions of Lepidoptera by Walker would have to be thrown out.

Mr. Fletcher stated that when young larvæ were in peas, the radicle would be the first point attacked. It had been his experience that only from two to five per cent. of attacked peas germinated.

Mr. Lintner stated that those which germinated and gave vigorous plants had but few pods, and these but few beans. One point of interest was that *obsoletus* is not found in Canada except when directly brought in.

Mr. Webster then introduced Dr. Edward Murphy, of New Harmony, Ind., who gave the Club an interesting account of the life of the pioneer of American Entomology, Mr. Thomas Say. Dr. Murphy was intimately acquainted with Mr. Say from 1827 to the time of his death in 1834. "In boyhood Mr. Say was a great collector of all sorts of natural history specimens. He was the most perfect gentleman that I ever met in my life, and I do not believe that he had an enemy in the world. He was tall, about six feet in height, square built, but not fleshy. In winter he wore a thick buckskin overcoat. He had a peculiar lisp in his speech which was pleasant to hear. As a boy I worked in a printing office where some of his works were published. Mr. Say was a very pleasant story teller, and very studious. The colour of his eyes was gray. He always lived in a very plain manner, and his old home is still standing at New Harmony, and in fair repair. His wife often accompanied him on his collecting trips. She was a very pleasant lady. Mr. Say was induced to come to New Harmony by Mr. Maclure, an amateur naturalist."

Mr. Hubbard then read the following paper :—

THE LIFE HISTORY OF XENOS.

BY HENRY G. HUBBARD.

How often, in turning over the pages of his check-list, has the American collector of beetles allowed his eyes to rest a moment upon those lines of type which announce the existence in our fauna of the mysterious family Stylopidæ, with its two genera, *Stylops* and *Xenos*. each represented by a single species ; but, recognizing in these names only the records of captures almost legendary in their antiquity, he has turned the page with a feeling that they represent to him unattainable rarities. In fact, to most minds they bring to remembrance only the remarkable bat-like figure of the male Stylops, which for generations has done duty in all the encyclopedias and text books. But why should these insects be considered unattainable rarities? Are they as rare in nature as their vacant places in our collections would seem to indicate? I do not hesitate to assert that they are not. If we question any hymenopterist of experience, he will tell us that Stylopized bees and wasps are not uncommon. By this is meant that specimens of hymenoptera are found having certain chitinous particles protruding from their hinder bodies, appearing at the sutures between the abdominal segments. These betray the presence in the wasp or bee of either the female or the pupa of the male parasite. In the first case the so-called head of the female presents only a bluntly-pointed scale, so flat and thin that it hardly raises appreciably the horny covering of its host, and, at most, barely peeps out beyond the edge of the overlapping plate. The pupa of the male, on the other hand, is a cylindrical capsule of considerable thickness, and often distorts the smoothly tapering abdomen of the hymenopteron. Its darkly chitinous, convex end projects boldly forth, and certain little tubercles upon its surface form a grotesque face, with staring goggle eyes, which are in fact faceted, and perhaps give a limited amount of vision to the nymph imprisoned within. When the winged male of the parasite issues from this capsule, the mask-like face is pushed off like a cap and falls to the ground. As a rule, when stylopized hymenoptera are captured in the field, the male parasites have long since issued, and hence their rarity in our collections. But the females never leave the bodies of their hosts, and might be readily obtained at certain seasons.

In general it has long been known that Stylops inhabits bees, and Xenos wasps of the genus *Polistes*. As far as I know the male of Stylops is not to be found in any American collection, but specimens of Xenos have been sparingly collected in this country, and it may therefore be of interest to relate my own experience in procuring them.

In 1891, while studying the insects that attack the orange in Florida, I had occasion to examine the nests of *Polistes Americanus* (Fab.), which are very commonly found in orange trees. This species is one of the largest in the genus, and its sting is quite equal in severity to that of our white-faced hornet. It is, moreover, very active and belligerent in defending its home, so that the investigation of its social economy is attended with considerable danger and difficulty. However, it is not inclined to be irritable unless directly attacked, and with care I was able to approach sufficiently near one of their large, naked paper nests to observe all their movements without seriously alarming the colony. One of my first discoveries was that many of the adult wasps were stylopized. Sometimes eight or ten of the parasites distended the body of a single wasp, and this without destroying its life, although it could be seen that such overburdened individuals were lacking in vitality, and appeared to be on the sick list, as they rarely left the shelter of the nest. The older wasps were actively engaged in attending to the wants of the colony, and were constantly departing and returning with small caterpillars and other insects, which, after masticating into pulp, they fed to the young, both larvæ and imagos. The callow young, however, passed several days of their adult existence in a state of inactivity, and did not leave the vicinity of the nest, apparently acquiring their full powers, both mental and physical, rather slowly. I soon found that only these late comers in the colony carried about with them the undisclosed males of the parasite. The pupa cases found in the bodies of the older wasps were invariably collapsed and empty. This decided me to take possession of the nest and confine it in a vivarium, where I could study the young wasps from the time of leaving their cells in the comb. After some difficulty, and not without carrying away with me a few tokens of the vengeance of its defenders, I bore away the comb in triumph, and suspended it in a small box with sides of glass, through which I could observe everything that transpired. Through the wooden end of the box I inserted a tube filled with sweetened water and closed with a bit of sponge. I included in the box, as caretakers for the young, one or two fully adult wasps. These soon resigned themselves to their new surroundings, and not only themselves drank liberally at the feeding trough, but also attended to the wants of the larvæ and the newly disclosed wasps, which immediately began to make their appearance from many capped cells in the comb. In about a week I had a colony in full career, and it soon became so populous that I was obliged to remove many of the adults. This was accomplished with the aid of a long pair of forceps manipulated through a trap door.

As my primary object was to secure the coveted males of Xenos, I was not a little chagrined and surprised to find that these continually escaped me, and in some mysterious manner disappeared, so that I was not even gratified with a glimpse of one of them. That they were produced within the vivarium I could not doubt. The empty capsules protruding from the bodies of many of the wasps were evidences of this, and the little mask-like lids which lay plentifully scattered about on the bottom of the box confirmed the fact. Moreover, many wasps a day or two old wandered about with the little faces of the unopened male capsules grinning at me from between the joints of their bodies, as if mocking at my discomfiture.

At last, early one morning, chancing to take a look at my captives, I observed the whole society in a state of great excitement. Wasps stood about with wings half raised or vibrating angrily, with antennæ alert and watchful, while now and again one of them would make a sudden dart with its jaws at an invisible object in the air. The whole company seemed bewitched. Steadying my eyes and watching closely I began to see several misty little objects darting with fury about the box. ever and anon dashing among the wasps, which, like cattle attacked by gad-flies, huddled together in groups and awaited the onslaught. In the dim half light of the early morning I could not follow their rapid movements with my eyes, but their whereabouts could be told, from time to time, by the commotion among the wasps whenever one of them approached very near. Finally, on the floor of the cage, a male Xenos suddenly made its appearance, spinning round and round on its back like a fly with its wings burned in a candle flame. A Polistes standing near the spot promptly pounced upon it, and, before it could be rescued, had reduced it to pulp in its jaws. In the same manner I lost, one by one, all of the four or five specimens that were abroad at that time. Such was the watchfulness of the wasps, and so great their hatred and fury against these little persecutors, that in spite of all precautions nearly all the male parasites were captured and destroyed before I could lay my hands on them I succeeded in saving not more than half a dozen speccimens out of more than a hundred that were set free in the box. As no additions were made to the brood, and many of the youngest larvæ died in their cells, in a few weeks my vespiary came to an end, having been under observation from the 23rd of June to about the middle of July. From the study made of its habits during that time I am able to give the following review of the life history of Xenos. Many of the facts are not new, but have been so rarely observed that it will not be amiss to repeat them.

The young issue from a slit in the so-called head, which may after all be the anal extremity of the mother, after it has protruded from the body of the wasp. A single female gives birth to hundreds if not thousands of them. They are at birth six-legged triungulins, fairly active, but so small that they are barely visible to the naked eye. Under a hand-lens they bear a marked resemblance to the young of scale insects, having a similar oval form and a pair of long anal stylets. They wander over the body of the wasp, apparently giving it no inconvenience, and are also seen crawling about the nest. In some way they pass into the bodies of their hosts while the latter are very young larvæ. Within the bodies of the wasp-grubs they occupy varying positions, but always in the fatty matter near the skin. Their form now becomes very elongate and worm-like, without any organs visible under low magnifying powers. Their delicate and transparent bodies seem to be simple sacks filled with fatty matter, in which float globules of oil. When full grown the larva of Xenos is about three-eighths of an inch long. The female parasite finally acquires a chitinous plate at one end of the body and becomes adult. The male shortens to about one-half its former length, thickens and becomes cylindrical, the anterior end is chitinous and shows traces of faceted eyes and rudiments of other organs, the convex end of this chitinous portion is separated by a sutural line, and forms the mask-like cap of the puparium. While the wasp is in pupa, or at least before it has left its cell in the comb, the parasites of both sexes push their chitinous extremity out of its body, appearing at the sutures of the last four or five segments. Within a few days after the wasp has left its pupa cell, the male Xenos pushes off the lid or cap of its puparium and makes its appearance, taking flight at once. It never alights or rests in its flight from the moment of birth until it falls exhausted and dying, worn out by the incredible activity of its short existence. Its life as an active imago cannot be longer than fifteen or twenty minutes, if as long, and during this time it exhibits fiery energy, and flies so rapidly that the eye can hardly follow it. Its legs are shrunken and entirely useless organs, and I think the muscles are atrophied, as I never saw the legs move even in the death struggles. How the fertilization of the female is accomplished I am unable to state, but that it must be the act of a moment is evident from the watchfulness of the wasps, who would certainly not permit these buzzing little whirligigs to remain more than an instant in contact with their bodies.

All the males bred by me issued very early in the morning, and most of them before daylight. I do not think its delicate wings and imperfectly chitinized body could support, even for a single minute, the light and heat of the sun. A specimen which I liberated in the day time from the body of a wasp, took flight and escaped at once when the cap of its puparium was pulled off. I found it a few minutes later quite dead on the table a short distance away.

The species of *Xenos* bred in Florida from *Polistes americanus* is probably undescribed; it is smaller and paler than *Xenos Peckii.* The latter is said by Harris to have been "discovered by Prof. Peck in the common brown wasp *(Polistes fuscata)* of this country." Judging from the numbers of stylopized specimens of this wasp which I have seen it must be far from rare in some colonies. The few specimens of *X. Peckii* which I have been able to obtain were all extracted from their puparia in the bodies of wasps taken near their nest between the walls of an old building. One specimen which I collected in the Cumberland Mountains of Virginia issued from the body of a *Polistes* found hiding under bark. I imprisoned the wasp in a glass tumbler, and several days later found the parasite dead and adhering by one wing to the side of the glass.

A good device for procuring specimens of *Xenos* from colonies of *Polistes* known to be infested with the parasite would be to enclose the nest in a box having a false bottom of wire netting through which the males of *Xenos* would fall as they die, and which would thus prevent the wasps from destroying them.

Mr. Hubbard stated that he had never seen stylopized wasps of any genus but *Polistes.*

Mr. Ashmead stated that they were quite common among the Andrenidæ.

Mr. Riley thought that these parasites could be divided into two classes, those that were carried into the cells by the female wasp, and those that were deposited by the parent of the parasite.

Mr. Kellicott stated that the case bearer, *Thyridopteryx ephemeræ*-

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formis, which he had found at Columbus, Ohio, were somewhat different from those exhibited by Mr. Southwick, *i. e.*, more nearly cylindrical.

Mr. Riley stated that he knew of no other species of Thyridopteryx similar to *ephemeræformis*, although this species differed much as to the character of their cases, especially those upon pine, when compared with other trees.

Mr. Kellicott stated that the larvæ of *Pterophora melsheimeri* which he had noticed at Columbus did not have the prominent paddle-shaped appendages at the side of the head as always described ; that the case was a more perfect structure than that figured by Harris ; and that the moth's wings were more deeply sinuate, with the edges trimmed with white.

The Club then adjourned.

FRIDAY, August 19, 1892.

The Club met at 9.45, fourteen members present. The minutes of the morning meeting of the previous day were read, and after amendment, approved.

Mr. Lintner occupied the chair while Mr. Schwarz read a paper upon the Males of *Xyleborus*.

Mr. Schwarz stated that there was no relative proportion of numbers of the females to the number of males. In reply to a question by Mr. Lintner, Mr. Schwarz stated that the white lining found in the borings of *dispar* and other species was supposed to be a fungus, but it was not known definitely.

Mr. Smith thought it could be easily determined if it was a fungus by microscopical examination.

Mr. Osborn followed with Notes on the Species of Acanthia.

NOTE ON THE SPECIES OF ACANTHIA.

BY HERBERT OSBORN.

I desire to call attention to the species of this genus, in order to get further information, if possible, as to the occurrence of the species in this country. The species of the genus that were described by Jenyns (Annals of Natural History, 1839, III., p. 241 244) have often been considered simply as the common house-bug occurring upon the different animals which they were described as infesting—the bat, the pigeon, and the swallow. As these descriptions are quite inaccessible to most students, it will be in place to repeat them here, so that they may be compared and used in the examination of any specimens obtained from different species of animals:—

"*Cimex hirundinis.*—This species is rather less than *C. columbarius*, and in respect to form different from both that and the *C. lectularius.*

"The antennæ are comparatively short, and the third joint is scarcely, if at all, longer than the fourth. The eyes are not so prominent, the thorax is much less hollowed out in front, the anterior angles but little produced, and the sides scarcely at all reflexed. The scutellum is wider at the base or more transverse, and does not project so far backwards. The elytra are less coarsely punctured; the abdomen is not so broad and more rounded at the apex; the sides regularly curved. The whole insect is more pubescent. The colour is ferruginous inclining to testaceous, darker than in the common bed-bug, and the head and thorax are much clouded with fuscous. In one specimen the legs are spotted at or near the joints with this last colour. There are also some fuscous spots on the abdomen.

"The young or pupæ have the abdomen much narrower than the perfect insect, inclining to oblong.

"*Cimex pipistrellæ.*—The antennæ of this species are of an intermediate length between those of the *C. lectularius* and those of the *C. columbarius*, and the third joint is obviously longer than the fourth. The eyes are prominent. The thorax has a moderately deep excavation in front, and the sides are partially reflexed. The abdomen is narrower than in either of the above named species, and much more attenuated posteriorly, the greatest breadth being rather before the middle. The thighs are more incrassated. The whole insect is more pubescent approaching to hispid, and rather coarsely punctured. The colour is dark ferruginous-ochre, glistening with a faint metallic or sub-aeneous hue, not perceptible in any of the other species. The legs and antennæ are a shade paler than the abdomen, and, as well as this last, without spots.

"*Cimex columbarius.*—On comparing this species with the common house-bug, it will be found to be smaller and of a more orbicular form. The antennæ are shorter, and the joints are not quite so slender, and the difference in length between the third and fourth joints not so considerable. The thorax is rather less hollowed out in front, the anterior angles less produced, and the sides less reflexed. The abdomen more nearly approaches to round, the lateral margins being very much curved, and the greatest breadth exactly in the middle; whereas, in the house bug the lateral margins are at first but little curved, and the greatest breadth rather behind the middle. The colours, as well as the punctures and the degree of pubescence, are similar in the two species."

Of these species the first named, the *hirundinis*, has been collected in large numbers by Prof. Gillette and myself at Ames, from the nests of barn-swallows, being first reported to us by workmen who were placing eavestroughs on the barn.

A short note on the species was published by Prof. Gillette in "Entomological News," under the name of *pipistrellæ*, with Mr. W. H. Ashmead cited as authority for the determination. The use of this name came from some verbal misunderstanding, we believe, and there is no question as to the specimens belonging to the form described by Jenyns as *hirundinis*. The specimens when compared with *lectularius* show very distinct differences, and these differences appear to be constant, as well as the habit of the insect, and it seems to me that the separation of the species is well founded, especially if the other forms are as distinct as this, and we would gather as much from the descriptions which have been quoted.

I should very much like to secure specimens or information as to the occurrence of the other species in this country, and the principal object of this note is to engage the attention of some one who may have the opportunity to examine the nests of bats and pigeons, where possibly they may be found.

The species found in the swallows' nests appears to remain entirely in the nests or upon the barn adjacent to them, some being observed on the sides of the barn nearly down to the ground. They were very abundant after the swallows had left, and specimens kept in a bottle corked with a rubber stopper were alive and active the following summer, so it would seem an easy matter for them to remain in the nests till the return of the swallows in the spring. The nests contained immense numbers of empty egg shells, showing that the eggs were deposited directly in the nests, and where the young bugs when hatching would at once get access to the birds.

In reply to a question by Mr. Stiles, Mr. Osborn stated that his observations were based upon the examination of several hundred specimens. He had examined what few bats he had had in the laboratory, but had had no opportunity to examine them in caves.

Mr. Lintner stated that housekeepers were generally of opinion that swallows brought *Acanthia* into houses.

Mr. Hubbard stated a case coming under his observation where a bat had been put into an entomological case, and upon examination of the case afterwards a living *Acanthia* was found.

Mr. James Fletcher gave an entertaining occount of a trip to Nepigon, north of Lake Superior, in quest of eggs of *Chionobas macounii*. No eggs of that species were obtained; but many interesting observations were made. Eggs of *Nemeophila selwynii* were secured, and the larvæ bred from them were described. *Grapta faunus* was bred from larvæ found on *Alnus viridis*, *Salix discolor* and *Betula papyrifera*, and an undescribed parasite was also reared. *Grapta progne* was also reared from larvæ on *Betula papyrifera*. The pupæ of several species of Grapta were described and outlines shown on the blackboard by which they could be distinguished. *Colias interior* was mentioned, and the food plant was stated to be willow (from the observations of Mr. T. E. Bean in the Rocky Mountains). Mr. Fletcher was of the opinion that it was also *Vaccinium*. Specimens of two western species of Argynnis, *A. cipris* and *A. electa* were taken at Nepigon, and the occurrence there commented on. *Lycæna lucia* was taken and an addition made to its food plants in the flowers and seeds of *Acer spicatum*. *Carterocephalus mandan* is not uncommon at Nepigon in roadways running through low woodlands. Eggs had been secured on grasses and several larvæ were being bred. *Nisoniades icelus*, common at Nepigon, was being bred from eggs laid on the upper side of the leaves of *Salix cordata*. The larvæ were found to exhibit different temperaments, one particular specimen being described as "very bad tempered". Some beetles had been collected, and the oviposition of *Myodites zeschii* in the unopened flowers of *Solidago canadensis* was described. An interesting Mordella had been taken on a white fungus growing on an old wharf, but the species did not seem to answer to any of those in the available literature. Species of Donacia, Leptura and some Carabidæ had been collected. *Trirhabda convergens* had been found abundantly on asters and solidagos. Of Hymenoptera many interesting species had been secured, *Abia kennicottii* amongst them, and several specimens of *Trichiosoma triangulum*.

Mr. Smith remarked upon the inactivity of Myodites. He had taken them upon solidago in New York State and had experienced no difficulty in collecting them upon the flowers at any hour of the day.

Mr. Schwarz stated that they were very active on buds, and it was somewhat difficult to collect them.

Mr. Cook then gave a few Notes on the Arthropoda of Liberia.

[TO BE CONTINUED.]

NEW NORTH AMERICAN HOMOPTERA.--No. V.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

1. THAMNOTETTIX SMITHI, n. sp.

Male: Form of *Th. quadrinotata*, Fab., but with the vertex shorter and more depressed. Greenish-yellow; head yellow with a transverse black band on the anterior edge; body black the segments edged with yellow. Length 4½ mm.

Head rounded before, very little longer at the middle than next the eye. Vertex a little depressed, anterior edge subacute; apex of the front two-thirds the width of the base, sides nearly parallel below the antennæ. Clypeus strongly widened apically where the width is but slightly less than the length, edge of the cheek rectilinear either side of the prominent lateral angle. Pronotum rather long, hind edge but moderately concave, the angles obvious. Antennal setæ long and stout, dusky. Valve obtuse-triangular, its length and breadth subequal; plates irregularly ovate, shorter than the valve, sutural edges arquated, touching only at the middle, outwardly heavily fringed with long white hairs; pygofers slender, longer than the plates, viewed from beneath lanceolate with slightly diverging tips.

Colour pale greenish-yellow, lemon-yellow on the vertex and connexivum, anterior edge of the head marked with a conspicuous broad black transverse band just below the line of the ocelli; sutures of the clypeus and front slenderly black. Meso-, and meta-thorax and abdomen deep black, narrow edge of all the segments, the scutellum and the genitalia greenish-yellow, the disc of the valve and a spot on the base of the pygofers blackish. Elytra sub-hyaline, smoky at apex, with slender greenish nervures. Wings smoky, iridescent.

New Brunswick, N. J. Described from a single male example kindly given me by its captor, Prof J. B. Smith, to whom I take pleasure in dedicating it. This is a neat little species pertaining to the group represented by the European *quadrinotata*.

2. THAMNOTETTIX LONGISETA, n. sp.

Female: Closely allied to the preceding species. Dull yellowish or dusky green. Vertex as in *Smithi*, anterior edge more obtuse, impressed line blackish at base, disc anteriorly with a small dot behind each ocellus, edge with a transverse row of four large subquadrate, approximate spots placed just below the line of the ocelli; edges of the front more deeply excavated opposite the antennæ, disc with three or four blackish arcs interrupted on the middle; clypeus less expanded apically. Cheeks thin, discoloured exteriorly, angles more rounded than in *Smithi*, sutures of the face more heavily lined with black. Second joint of the antennæ annulated with black; seta long, as in the preceding species. Pronotum shorter, with the sides more oblique, the posterior angles more rounded, and the hind edge more deeply excavated than in *Smithi;* disc greenish, marked anteriorly by a slender, oblique black line behind the eyes, touching the lateral angles. Elytra hyaline, slightly infuscated toward the apex; nervures very distinct, pale blue-green, brownish at apex. Beneath black; narrow edges of the connexivum and abdominal segments, outer angles of the last ventral segment, and sides of the pygofers, yellow. Legs pale yellow. Last ventral segment rather long, hind edge entire, truncated, the outer angles slightly produced. Length 4 mm.

Northwestern Colorado. Described from a single female example received from Prof. C. P. Gillette. This is closely related to *Th. Smithi*, of which it may prove to be the female, but the differential characters mentioned above seem to entitle it to specific distinction.

3. Thamnotettix Gillettii, n. sp.

Form and general appearance of *Th. lætus*, Uhl.

Female: Colour yellow, tinged with greenish on the pronotum. Vertex moderately produced, apex rounded, basally with an impression either side of the middle. Front narrower than in *lætus;* clypeus widened apically, the sides arquated. Apex of the head with two large round spots, and on the vertex on either side is a smaller one placed against the middle of the inner margin of the eye. Pronotum highly polished with an impressed line parallel to the anterior edge, hind edge nearly straight. Scutellum polished, the impressed line black. Sutures of the front and the antennal pits black, the setæ dusky. Sternal and pleural pieces black, the latter edged with yellow. Abdomen yellow, disc of the tergum and the oviduct black. Legs yellow, tips of the tarsal joints dusky. Elytra hyaline, smoky at tip, nervures yellow, becoming heavier toward the inner margin. Last ventral segment rather long, outer angles rounded, apex nearly straight with a narrow linear notch. Length 5 mm.

Colorado. Described from a single female example received from Prof. C. P. Gillette, to whom I take pleasure in dedicating this pretty little species.

In Mr. Gillette's material was an example of a species I take to be Mr. Uhler's *Jassus (Thamnotettix) lætus*, but it differs from his description in wanting the minute fuscous dots at the tip of the vertex, and the black basal spots on the scutellum. In this specimen, a female, the last ventral segment is cylindrical, a little longer than the preceding and feebly arquated behind without a median notch. Clypeus slightly narrowed apically, its sides rectilinear.

4. THAMNOTETTIX MONTANUS, n. sp.

Allied to *Th. clitellaria*, Say. Smaller; dark brown or blackish, face pale. A transverse band on the pronotum and a small spot on the elytral suture yellowish-green, polished. Length 4½ mm.

Female: Head obtusely rounded before, soiled white or yellowish, base of the vertex with a transverse fulvous-brown band between the eyes covering the apical one-half of the pronotum, ocelli fulvous; front with a few short brown arcs next the edges, the sutures blackish, clypeus slightly widened apically; cheeks infuscated below the eyes. Pronotum polished, pale greenish-yellow on the posterior one-half, hind edge feebly concave. Scutellum dark brown, blackish on the base and apex, the impressed line black. Elytra blackish, costal half of the corium as far as the apical areoles hyaline, apex of the clavus and its nervures black, sutural edge with an oblong greenish spot. Beneath black. Legs whitish. Abdomen black; connexivum, a slender median line on fourth and fifth, apex of the ultimate, and the narrow edges of all the ventral segments, and the oviduct, pale yellowish. Last ventral segment deeply cleft either side of the ligulate median projection, the shorter lateral lobes rounded, retreating at the outer angles. Male: More deeply coloured, scutel and elytra black; abdomen black, connexivum and ventral segments narrowly edged with yellow. Valve half the length of the last ventral segment; plates nearly three times the length of the valve, punctured, obtuse, suture straight, outer edge feebly convex; pygofers exceeding the plates, pale, as is the apical half of the plates.

British Columbia; Mountains of northwestern Colorado. Described from a fine pair received from Prof. Gillette and one male received from Mr. W. H. Harrington and labelled "British Columbia." This latter differs from the Colorado male in being more deeply coloured, with the transverse band between the eyes black, and showing two small transverse spots on the base of the front.

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MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1892.

(Continued from page 265.)

Mr. Osborn followed with a paper upon

HONEY-BEE OR HOUSE-FLY.

BY HERBERT OSBORN.

Ever since entomologists have classified insects and attempted to assign a relative rank to different members of the class, the honey-bee has had the distinction of standing at the head of the list, has been the crowning point, the apex of an immense pyramid of inferior forms.

That so useful a member of the insect class should occupy this exalted position has seemed most appropriate, and that the reign of the honey-bee has had universal sanction is proven by the fact that it has so long held undisputed possession of the throne.

In recent times, however, ruthless hands are raised in treasonable attacks upon Queen Apis ; and whom do they propose to crown instead? No less an arrant disturber than the ubiquitous, omnipresent, insolent fly. Down with Queen Apis!! Up with King Musca!! How does that sound?

All this is proposed by a young man, Prof. Aldrich, who makes flies his especial pets, and he backs himself up with such authority as Prof. Hyatt and Miss Arms, and is seconded by Prof. Townsend. The worst of it is that these revolutionists seem to have the logic of the situation. To be sure, it is suggested that the sheep-tick may, in the ultimate analysis of the scheme, be the enthroned insect, but we fear that all other claimants will be downed by the house-fly. What a travesty on beneficent evolution, to produce this pestiferous plague—the most unmanageable rascal afloat—as its most finished piece of insect handiwork. Can nothing be done to avert such a calamity? Have we no talented evolutionist who can discover some series of relationship to prove that Musca lacks the royal blood to entitle him to the throne, or, if his lineage be too strong, had we not better establish a democracy of insects and, by the suffrages of tortured animal life, relegate this buzzing busybody to his proper sphere?

Seriously, however, I am led to inquire whether there is not strong reason why we should make an effort to avoid the expression of lineal rank in groups of animals. The most specialized are often degraded in many respects, and there is no basis for the expression of rank except their phylogeny, and the higher groups of insects are certainly not connected in any lineal series, but represent divergent, or in some cases, perhaps, nearly parallel branches from some common ancestral form or group of connected forms. To place any one group as the head of a lineal series is to give an expression that is not present in nature.

Lists of insects may have to be written in a lineal order, but can we not emphasize more strongly the point that this order is not an expression of natural relationship?

Mr. Smith thought that the line of argument adopted by Messrs. Aldrich and Townsend was inconclusive, and that the article referred to carried with it its own refutation. He thought Mr. Osborn was correct in that the orders should be placed parallel, but that groups or families were more highly developed in some orders than in others. Mere specialization is never a test of rank in itself, and any line of argument that places the Hippoboscidæ at the head of the insects as the highest in rank, is simply unworthy of attention, since it omits the intellectual or nervous development as a factor.

The Secretary read the following paper:—

THE LIFE-HISTORY OF THE NORTHERN MOLE-CRICKET—GRYLLOTALPA BOREALIS.

BY E. W. DORAN, PH. D., COLLEGE PARK, MD.

Although this is a common insect in many parts of the United States, it is not generally found in great numbers in any locality, and, notwithstanding its general distribution, the various stages of the insect seem not to have been described or figured.

While I am not yet able to clear up all the points in its history, I have studied the insect in all its stages, though I have not reared it from the egg to maturity, on account of the time required for it to develop—in all probability three years.

During the last six months I have had about fifty specimens in confinement, representing all the stages of the insect. They were nearly all obtained in one limited locality, about the edge of a small pond near the Maryland Agricultural College. I found every stage in this locality except the egg. Two females oviposited in the breeding jars, and I now have larvæ about two months old. I present the following description of the insect in all its stages :—

1. *The egg.*—The eggs were deposited in confinement in irregular heaps without any apparent arrangement. The number is only 40 to 50, though it is stated that *G. vulgaris* deposits 200 to 300. There is an irregular enlargement of one of the canals, about an inch and a-half in diameter, in which the eggs are placed.

The egg is of a dirty whitish or light brown colour, opaque, with no distinct external markings. Length, about 3 mm.; width, 1.7 mm. Shape slightly ovoid-reniform.

The date of the deposition is a little uncertain. May 20, 1892, I made extensive excavations in their burrows, but found no eggs, though I took three gravid females ; one of these was dissected, and the eggs appeared pretty well matured, though not full size. Two females were placed in confinement, one had oviposited June 8, eggs from the second were not found till June 25. The eggs of the first had hatched June 18, ten days after they were found. The eggs of the second hatched between Aug. 1st and 10th, about a month and a-half after the first lot, and five or six weeks after they were deposited. Both were subjected to the same conditions.

2. *The larva.*—When first found the larvæ may have been a week old. They closely resemble in appearance the mature insect. Length, 6 mm. ; antennæ long, 37 mm., anal stylets, 3 mm. Head and thorax shining black, with median dorsal line lighter. Abdomen lighter in colour than thorax ; the dorsal part of each segment dark brown, the space between segments creamy ; the first three rings very dark, the rest lighter, except the 7th, which is generally broad and dark. The underside of the body is creamy white. Anterior pair of legs light brown, middle pair with femora darker, posterior pair darker except at the joints, tarsus of first pair broad, toothed, as in imago. Legs and abdomen slightly pubescent. Before the first moult the larvæ have the power of leaping several inches. After this they do not seem to have this power, and are more sluggish in their movements. After the first moult they have the

power of ejecting a viscid, nauseous fluid for protection, and if several are confined in close quarters they invariably get badly "stuck up" if excited. After first moult the colour of the dorsal part of the abdomen is darker.

The larval stage evidently lasts about two years. Several specimens taken Jan. 4, 1892, were about 13 mm. long. These kept in confinement in a warm room during the winter moulted April 18th, when all died. They were then about 16 mm. in length. May 20, two or three larvæ were found which were very little larger than those taken in January before. They are said to be inactive in winter, hence had not grown so fast as those kept in a warm room. Along with these small larvæ were taken some about 18 mm. in length, but much stouter in appearance, all of which had pupated before June 18. These last larvæ were evidently about two years old, and after pupating were not distinguishable from pupæ taken at the same time.

3. *The pupa.*—After pupating they are about 29 mm. in length, with considerable increase in thickness, especially in the abdomen. There is a very slight change in appearance otherwise, except for the appearance of the small wing pads.

This stage evidently lasts almost a year. Those which pupated in June, or last of May, will not deposit eggs this year. They are yet (Aug. 15) pupæ.

4. *Imago.*—The mature insect has but short, apparently feeble wings, while the body is long and heavy, hence their powers of flight are evidently not great. The male measures about 31 mm. in length, while the female may reach 37 mm. or 38 mm. This stage has been described and figured in various publications.

Food Habits.—It is generally supposed that the mole cricket lives chiefly upon roots of grasses, etc. I much doubt that this is the usual food, and it is certainly not the entire food. In the wild stage the burrows are generally found in moist, sandy places near the water, often where no vegetation is found. They make long, winding channels, often six to eight inches deep, forming new burrows very much like a mole. This habit would seem to indicate that they are in search of animal food, especially angle or earth worms. In confinement they seem to feed but little, if at all, upon roots of grasses, and for several months they have had nothing but earth worms given them, and they seem to thrive upon this diet. If pressed by hunger they will readily devour the smaller or weaker of their own kind. If two are confined in a small vessel over night one generally kills the other. Several of my specimens have been destroyed in this way.

Mr. Smith asked if it was known that some of the Acrididæ occasionally fed upon animal diet, and stated a case where a species of *Melanoplus* had been fed upon house flies.

Mr. Riley stated that several of the Acrididæ were known to be omnivorous, especially *Melanoplus spretus*. He also stated the experience he had had when in France in regard to a secret remedy a Frenchman had for destroying *Gryllotalpa*. Upon investigation, the secret remedy was found to be nothing but pouring soapsuds into the holes made by the insect.

Mr. Fletcher gave his experience with a specimen of *Gryllotalpa* in confinement in a glass jar. Potatoes were planted in the jar and the roots spread throughout the bottom of it. Meat was placed on top of the earth in the jar, but so far as he could notice the specimen ate nothing. It is a very animal-like insect, and is rare in Canada.

Mr. Hubbard thought that the *Gryllotalpa* was common in Canada, but was hard to find except in particular places.

Mr. Weed stated that he had the species sent for identification quite often, but it was rare except in particular places.

Mr. Riley then read a paper on "The Osage Orange Pyralid," by Mary E. Murtfeldt, Kirkwood, Mo. (Published in "Insect Life.")

Mr. Weed stated that the species was quite common in Mississippi, the moths having been taken abundantly.

Mr. Smith stated that the osage orange in some parts of New Jersey was seriously attacked by the Bag-worm, *Thyridopteryx ephemeræformis*, which was the only thing that seemed to trouble it.

Mr. Riley then read the following :—

NOTE ON A BORER IN THE STEM OF THE RED CURRANT.

BY E. W. CLAYPOLE, AKRON, OHIO.

For several years I have observed traces of a borer in the tips of the twigs of my red currant bushes, whose habits did not correspond with those of any insect with which I am acquainted. My knowledge of the subject is very limited, and I consulted the department at Washington. In reply it was suggested that possibly it was the same insect which infested the tips of the raspberry, *Oberea tripunctata*. But the facts not quite agreeing with this reference, I wrote to Prof. Riley, stating the facts in the case. The mischief, if such it can be called, is first noticed in the middle of May, two or three weeks before the signs of *O. tripunctata* are seen, and the girdling consists of a single ring instead of two, or if there are two the lower one is very indistinct. Moreover, the tip of the twig fades at once, and much more quickly than when attacked by *O. tripunctata*. Lastly, the later attack of *Oberea* is in my garden confined to the raspberry. I never find it on the red currant.

I was requested to send some specimens about the end of July, and I did so just before starting for this meeting. I received a reply a day or two ago from Mr. Marlatt, in the absence of Dr. Riley, saying that the insect was probably the *Janus flaviventris* of Fitch, found by Professor Lintner recently at Adrian, Mich. It is a saw-fly of the family Cephidæ, whose early history has not been well worked out.

Having little technical knowledge of the group, my only excuse for troubling the Club with this note is a desire to aid others in a work which I cannot, from the pressure of different engagements, now prosecute myself as formerly. Moreover, I think such short notes are peculiarly adapted for presentation to the Entomological Club.

Mr. Lintner stated some experience in regard to this species. An attacked twig dies down at the upper part above the cut. From a half dozen twigs which had been marked at the time of the attack and cut and sent to him the following spring, he had obtained but one specimen of the Saw-fly, and this did not appear to agree with Fitch's description of *flaviventris*.

Mr. Smith remarked upon the difficulty of obtaining specimens of the sexes of twig borers, unless the entomologist was constantly in the field and himself cut them out of the infested wood.

Mr. Fletcher then read the following:—

REPORT OF COMMITTEE ON AN ENTOMOLOGICAL CONGRESS IN 1893.

Doubtless all agree that the meeting of this Club and that of the Association of Economic Entomologists in 1893 may afford unrivalled opportunities for us to meet and make the acquaintance of many foreign entomologists; that the occasion may afford excellent opportunities to make known our own methods and to extend a knowledge of the nature and extent of entomological investigation being done in this country among those of other countries engaged in similar pursuits, and enable us to learn the same concerning them. In other words, our next annual meeting should be an occasion of great social advantage and of mutual scientific and practical benefit to ourselves and our visitors. To attain this should be our aim. The Association of Economic Entomologists and the Entomological Club of the A. A. A. S. have mutually pledged co-operation in this matter. A plan, therefore, for attaining the desired end is the question for present consideration.

The Committee, after due consideration, submit the following suggestions for your consideration and that of the Association :—

1. That the Executive Committee of this Club (understood to consist of its officers) shall be authorized to act for us jointly with an authorized body of the Association.

2. That as early as January, 1893, the Association concurring, a joint communication be sent to foreign entomologists and Entomological Societies generally inviting attendance, stating the nature of our meetings and soliciting papers and demonstrations for the same.

3. That members of both organizations be asked and urged to present examples of their best work in a finished state, illustrated as far as practicable by specimens, charts and drawings, and that the same be reported to the respective Secretaries in ample time for arrangement and the printing of a programme before the beginning of the meeting.

4. That the economic papers, regardless of authorship, be assigned to the meetings of the Association, and those of systematic or biological nature in like manner to the meeting of the Club. Visiting entomologists should, of course, be considered members for the time being.

5. That we believe an interesting feature would be an exhibition of uniques.

6. That the feasibility of a practical exhibition of apparatus and methods should be considered, and if possible instituted.

7. That a banquet in honour of our visitors should be made a feature of the meeting.

8. That the history of economic entomology in America should be treated by a competent hand.

9. That these propositions should be submitted to the President of the Association of Economic Entomologists.

D. S. Kellicott, Chairman.
L. O. Howard.
James Fletcher.

The report was adopted, and the officers of the Club were appointed a committee to issue a circular in regard to the Entomological Congress, inviting foreign entomologists to be present at the meeting of the Club next year.

The committee appointed in reference to the preparation of a Manual of Entomology reported progress, and, upon motion, were continued until another year.

The committee appointed to nominate the officers for the ensuing year reported as follows :—

President—Chas. J. S. Bethune.
Vice-President—H. G. Hubbard.
Secretary—C. L. Marlatt.

The report was adopted and the officers elected.

An adjournment was then taken until four p. m.

The Club assembled at four o'clock, and Mr. Weed read the following paper :—

NOTES ON THE INSECT FAUNA OF THE MISSISSIPPI BOTTOMS.

BY HOWARD EVARTS WEED, AGRICULTURAL COLLEGE, MISS.

Geographically the State of Mississippi is divided into what is known as the hills and the swamps. The hills comprise the middle and eastern portions of the State, while the swamps comprise the western border or the country adjacent to the Mississippi River, the larger portion of which is overflowed every year.

The insect fauna of this region presents many things of interest, there being an absence of many species found in other parts of the State, doubtless owing to the inundation and consequent drowning out in the spring of the year. Indeed, how it is that some of the species which are quite common in this region survive an overflow lasting from three weeks to two or over three months, I leave for others to explain.

As might be expected, in this region there are found but comparatively few species, but these in great numbers.

It was recently my privilege to visit this region, going by boat from Vicksburg to Greenville, and stopping off for about two weeks midway between these places at Mayersville, in Issaquena County. These notes are not intended to be in any way complete, and I will only mention a few of the more common species, which may be taken as a fair example of the midsummer fauna of this region.

Very few Hymenoptera are here found, and they are, indeed, conspicuous by their absence. Humble bees are exceedingly scarce, and this no doubt accounts for the fact that red clover does not re-seed in this region, as it dies out at least by the end of the third year from planting. But very few honey bees are kept here. The fossores are among the most common hymenoptera, *Pelopœus cementarius*, var. *architectus*, being especially common. Various species of *Vespa*, *Polistes* and *Halictus* are also common.

The Diptera are well represented in many families. The swamps of Mississippi are said to be the land of mosquitoes and gnats, which statement is quite true, the many low places and stagnant pools forming an excellent breeding place for the former, while the rapid running streams and bayous tributary to the Mississippi form a good breeding place for the latter at certain seasons of the year. The Muscidæ are very numerous, the common house-fly being an especial great pest. Very few screen doors and windows are here used, and in many cases the meals during the summer months are served in the open air upon a side porch. In this region during the summer of 1890 the Screw-worm (*Compsomyia macellaria)* was very destructive to live stock. During the past two seasons, while no cases of injury have been reported, yet the species is quite commonly seen, not only about refuse matter, but, like the house-fly, it is often to be found flying about the table at meal time.

Neuroptera are not common, *Libellula pulchella* being the only species of the larger dragon flies noticed.

Lepidoptera are not very well represented in this region. Among the butterflies several species of *Colias* are abundant, while *Catopsila eubule* and *Papilio asterias* are occasionally seen. The Noctuidæ are the most common of the Heterocera.

Nearly all the families of the Coleoptera are well represented in this region. As might be expected, the sandy shore along the Mississippi river is a most excellent place in which to collect Cicindelidæ. Boats plying the river are furnished with one or two electric lights, which are only lit at the landings when freight or passengers are transferred. These lights attract many insects, including several species of Cicindelidæ, which may be easily collected on the deck under the lights. The most common species taken were *Cicindela repanda*, *C. hirticollis*, *C. punctulata* and *C. cuprescens*. These species are very common along the river shore, where the sandy strip, extending from the river's edge to the levees, forms an excellent breeding place for them.

The most common insect attracted by the electric lights is the Staphylinid *Bledius gularis*, which swarms upon the decks in countless thousands. By means of a small shovel I filled a large cyanide bottle full of this species in less time than it takes to tell it. Indeed, so common was the species that the electric lights were turned on only when actually needed at each landing, and by the time another landing was reached the decks would be nearly clear. Very often many of the specimens were trampled under foot and gave out a peculiar sickening odour.

Water beetles, especially the Hydrophilidæ, are very common. The family Heteroceridæ is exceedingly common, the most abundant species being *Heterocerus ventralis*, *H. undatus*, var. *limbatus*, and *H. pallidus*.

The only Coccinellidæ noticed were *Megilla maculata*, *Hippodamia convergens* and *Coccinella 9-notata*.

Cerambycidæ and Chrysomelidæ are especially common. *Lema peninsulæ* was so thick that large numbers would strike against a person when walking along the levees in the early morning. Flying with this species were large numbers of *Disonycha crenicollis* and *D. pennsylvanica*.

Orthroptera are fairly well represented by several species, the most common being *Scudderia curvicauda*, *Dissosteira carolina*, *Shistocerca americanum*, *Acridium obscurum*, *Melanoplus differentialis* and *M. atlanis*.

Hemiptera. especially Homoptera, are very abundant. Among the Heteroptera the most common species collected were *Amnestus pusillus*, *Metapodius* sp., *Leptoglossus phyllopus*, *Geocoris bullatus* and *Lygus pratensis*, while many species of Notonectidæ and Corisidæ were met with.

Many interesting species of Homoptera are to be found in this region *Cicada tibicen* is very common, while *Clostoptera xanthocephala* occurs in large numbers. Other common species are *Agallia 4-notata*, *Diedrocephala mollipes*, *D. versuta*, *Chlorotettix viridis* and *Homalodisca* *triqueta*, while the types of Mr. Van Duzee's new species, *Anthysanus bicolor*, *A. obtutus*, *Deltocephalus flavocastatus*, were collected here, *A. obtutus* being especially abundant.

In reply to a question, Mr. Weed stated that he had found no Myriopoda in this region.

Mr. Smith remarked upon the difficulty of obtaining specimens of Lepidoptera from the Southern States. He also stated that some of the species figured by Mr. Abbott had remained unknown until quite recently, and that in the British Museum there were excellent drawings of species undoubtedly new, or, rather, undescribed, and which have not been since found.

Mr. Weed stated that he had been disappointed in regard to the southern fauna, it having been his experience that there were plenty of insects, but comparatively few species.

Mr. Cook followed with a paper entitled "Do Termites Cultivate Fungi?"

Mr. Hubbard mentioned some of his observations upon Termites in Jamaica, which have been published in the Boston Society of Natural History.

Mr. Cook thought that the so-called fungi masses were only the wood which had been eaten or gnawed off by the Termites. Old Termites do not appear to have anything to do with these masses. The masses of fungi are about four or five inches through, and are not found in the central part of the hills.

Mr. Hubbard stated that these were different from those which he had observed in Jamaica.

The Secretary then read the following paper :—

THE WEB-WORM TIGER (PLOCHIONUS TIMIDUS, HALD.)

BY MARY E. MURTFELDT, KIRKWOOD, MO.

It would seem appropriate that this hitherto somewhat rare and inconspicuous little carabid should be brought to the notice of the Entomological Club of the A. A. A. S. in its new *rôle* of a benefactor.

I have been observing its habits for two years, and am confident that to it, more than to any other agent, do we, in the neighborhood of St. Louis, owe our present comparative freedom from the Web-worm nuisance. Whereas formerly almost every other tree would, at this season of the year, be infested with one or more of the disfiguring nests, they are now so few and far between that it requires some search to find one. I was particularly struck with the difference, in this respect, between this section and the Atlantic slope, on my journey to Washington last August, the eastern woods and orchards being in many places almost defoliated and presenting a very unhealthy and unsightly appearance from the ravages of this insect.

It is impossible, of course, to ascertain just when or how the beetle under consideration acquired the habit of preying upon the Web-worm; but I think it could not have been much previous to its discovery. In 1888 *Hyphantria* was abundant in Kirkwood, and for the purpose of obtaining fresh specimens of the moth, as well as of its usual parasites, I transferred a colony from a box elder tree to the rearing cage. From these a large number of perfect insects were bred and also parasites of two or three species, but no larvæ or imagines of *Plochionus* were observed.

Early in June, 1890, I had been struck with the wasting away of one or two colonies of *Hyphantria* and was about to examine into the causes, when I received from Mr. J. C. Duffey, the Horticulturist of the Shaw Botanical Garden, a note informing me that larvæ of a small carabid had been found in a nest of Web-worms, upon which they were evidently feeding. Accompanying this communication was a box containing one of the infested colonies. Unfortunately the box had been broken in transit, and when I called for my mail the Web-worms were pervading the office, and the distracted postmaster was engaged in a vain attempt to confine them in a newspaper, and expressing himself with some emphasis concerning the sort of mail posted by entomologists. Undoubtedly many of the predaceous larvæ escaped with the caterpillars, but upon examination, after reaching my study, I found seven or eight of the larvæ in the fragments of the web and a sufficient number of Web-worms to afford them sustenance. Placing them on fresh leaves in a small rearing cage on my desk, I soon had ocular verification of Mr. Duffey's interesting observations.

The *Hyphantria* larvæ had all passed the last moult and many were nearly full grown; the carabids were also nearly mature, varying in length from one-fourth to one-third inch, somewhat alligator-shaped, the head provided with sharply pointed trophi, with rather long and strong legs, the body above dark and horny; they had quite a formidable aspect. By preference this larva attacks its victim from the front, biting into the under part of the thoracic segments ; but in many cases I have seen it seize hold of the side of a caterpillar, into which it would soon almost bury its head, and not the most violent contortions on the part of its prey were of avail to dislodge it. By the time its appetite was appeased the Web-worm would be fatally injured, and a fresh one would be required for its next meal. In this way one beetle larva was capable of destroying a great number of the worms in the course of its development. The two species, web-worm and carabid, reach maturity about the same time, the period of carabid adolescence being about one week less than that of the insect on which it preys. The change to pupa takes place both on the surface of the ground and in the remnants of the web on the tree—in the latter case it (being very soft and white and not enclosed) is subject to destruction by birds and other insects. The beetle appears in from eight to ten days after the change to pupa, and requires a day or two to acquire its dark brown colour and the firmness in texture of maturity. It is very swift and furtive in its movements and remains hidden as far as possible during the daytime, but is, even in the rearing cage, quite active at night, using its wings freely. It feeds, sparingly, on aphides and similar soft insects. This season I found it in considerable numbers in the two web-worm nests that occurred in our orchard, and to test its destructive capacity I placed thirty-six three-fourths grown *Hyphantria* larvæ in a large glass jar, with three nearly mature *Plochionus* larvæ. A large number of the caterpillars were killed in the course of the following week, and from the three dozen larvæ I bred seven parasites (*Meteorus hyphantriæ*) and but three moths ; the remainder had evidently succumbed to their coleopterous foes, all three of which developed into fine beetles.

In respect to Mr. Duffey's wish to present the first published account of this insect, I refrained from mentioning it to the Club at the Indianapolis meeting, but referred to its valuable services in my notes for the Division of Entomology of the same year. Early in the autumn, 1890, Mr. Duffey read a paper on this insect and its interesting habits before the Academy of Science of St. Louis, giving its history somewhat in detail, and also technical descriptions of the adolescent stages, accompanying these with some tolerable illustrations. This paper was published in the Transactions of the Academy the following February, and renders it unnecessary for me to describe the larva and pupa more minutely.

I believe the perfect insect occurs sparingly in many sections of the country, but it may not in every locality acquire the habit of preying on

Hyphantria. It is to be hoped, therefore, that the divergent type will slowly spread from State to State until it, in connection with other predaceous and parasitic species, will practically relieve us of one of our most prominent arboreal pests.

Mr. Schwarz stated that it was rather singular that this habit of the species had not been hitherto noticed.

The Club then adjourned.

HOWARD EVARTS WEED, *Secretary.*

The following papers were not received by the Secretary in time for insertion in their proper places:—

GALERUCA XANTHOMELAENA POLYGONEUTIC AT WASHINGTON.*

BY C. V. RILEY.

It will be remembered that at the meeting of the Club a year ago, Professor J. B. Smith gave the results of his observations for that year upon the Elm-leaf Beetle at New Brunswick, N. J., and concluded that it was single-brooded there. His observations were so carefully made that his conclusions could not well be doubted; yet they did not agree with those made at Washington, where the species had been found to be at least double-brooded. In the article which I had published upon this insect in Bulletin 6 of the Division of Entomology of the Department of Agriculture, I had discussed the evidence as to number of broods, both from European sources and my own experience; but Professor Smith's observations were so conclusive, so far as his locality is concerned, that I felt the need of more accurate notes than any that had been published hitherto, and of the desirability of settling the question as to number of broods at Washington by a series of carefully-planned indoor experiments, where, by breeding from one generation to another, there could be no question of an erroneous conclusion. This I have done, and have communicated from time to time the results to Professor Smith, who has also communicated his to me, and in a general way I may say that the work at each point, so far as I have heard from Professor Smith up to July 28th, appears to bear out the previous conclusions and experience at either point. In short, Professor Smith finds the species to be single-brooded in New Jersey this year, whereas at Washington it is double-brooded as a rule, and produces at least a third and probably will produce a fourth generation, by exception.

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*See page 245.

During the first week of May of the present year the beetles were abundant, and by the 6th of May the first eggs were found. By the 20th of the same month the eggs were hatching, and by June 8th the first pupæ were obtained. By June 12th the bulk of the larvæ had transformed to the pupa state, and by June 18th, in the vivarium, the second generation of beetles (or first bred of the season) began to appear, and were in great numbers by the 20th of the same month. Before the end of the month of June most of the second brood of beetles had issued and eggs from this second brood were obtained in numbers and were numerous out of doors wherever the leaves had not been already ruined. Yet up to this time belated larvæ of the first generation were yet to be found. By the 15th of July the second generation of beetles began to get scarce and to perish in the vivarium. By the 18th of July the first pupæ of the second generation were observed, and the bulk of the larvæ were descending the trees. Nevertheless, at the same time and up to the 26th of July, there were eggs and larvæ of all sizes yet to be found of this second generation. During the last days of the month, these larvæ of all sizes were everywhere crawling about, having defoliated the trees. The third generation of the beetles in the vivarium began to appear on the 27th of July, exactly 27 days from the egg, and during the first ten days of August the eggs were obtained in the vivarium from this third generation of beetles. To sum up, the larval period of the first generation lasted from the third week in May to the end of June, the bulk transforming to the pupa state about the middle of June, the hibernated imagos being scarce or absolutely unseen during the month of June. The beetles of the second generation began to appear about the middle of June and were in force during the third week of that month, while yet a few larvæ of the first generation were to be found. By the end of June most of the second generation of beetles had issued, and the eggs of these were numerous where the leaves had not been previously destroyed. By the middle of July the imagos of the second generation became scarce, and during the third week of the month the bulk of the larvæ of the second generation were descending the trees. Some pupæ were formed, and a few of the eggs and larvæ of all stages were yet to be seen. By the last of July the third generation of beetles began to appear, and continued to issue during early August. The eggs of this third generation are laid only on fresh leaves.

Thus, as stated, there can no longer be any question that the species at Washington is double-brooded as a rule, and that it produces exceptionally a third and even a fourth generation. Yet during the latter part of July we have at Washington very much the same condition of things in the abundance of the larvæ and the injury of the trees from the second generation as they have at New Brunswick, N. J., from the first generation. I give below a detailed record of the observations made the present year, as noted by Mr. Theo. Pergande, who had charge of the experiment, though I have personally watched over and superintended the breeding and can confirm the accuracy of the record. Before leaving the subject, it may be well to note that in the fourth edition of the European Catalogue of Coleoptera, as pointed out to me over a year ago by Mr. John Hamilton, the nomenclature of this species is given as follows :

Galeruca luteola Müll., Mil. Turin 3, 187.
xanthomelæna Schrank, Ws., 627.
calmariensis Fab., Gyll. Ins. 3, 508.

There seems no other course than to follow the resurrectionists and to change the name that has already become so familiar to us once more in favor of *luteola*, unless we hold by the 20 years limit promulgated and discussed in the rules for entomological nomenclature considered in the early history of this Club.

STATEMENT OF EXPERIMENTS WITH THE ELM-LEAF BEETLE.

HIBERNATED OR FIRST GENERATION OF BEETLES.

May 3, '92.—Beetles now swarming and quite abundant on some of the Elms on the grounds of the Department of Agriculture, eating the characteristic round holes in the leaves.

May 6, '92.—First eggs noticed.

May 20, '92.—A few batches of eggs hatching. A lot of young larvæ are placed in vivarium. Marked also 8 colonies for outdoor observation.

May 27, '92.—Larvæ are casting first skins.

June 6, '92.—Larvæ are casting the second skin.

June 8, '92.—One Larva has changed to pupa. Larvæ on branches which were marked, May 20th, are leaving and descending the trunk. There are still great numbers of larvæ on the trees, some of them still in second stage. Placed a considerable number of larvæ in separate vivarium.

June 12, '92.—Most all larvæ in vivaria have changed to pupæ.

June 16, '92.—There are still a considerable number of larvæ on the trees. All are about full-grown. No beetles so far. Plenty of pupæ around base of trees.

SECOND GENERATION OF BEETLES.

June 18, '92.—Two beetles issued to-day from the lot in vivarium. None to be found out doors so far. Apparently the last of the larvæ are now descending the trees. Pupæ are present in heaps around base of trees. Placed a lot in breeding cage to obtain beetles.

June 20, '92.—To-day 51 beetles issued from lot in vivarium. Placed them all with a branch of Elm to permit feeding and breeding. Examined the trees but failed to find any of the beetles. There are still a few of the larvæ feeding.

June 21, '92—Noticed the first few beetles on the trees; there are still some larvæ.

June 22, '92.—Beetles have become somewhat more numerous, particularly on the last tree at the east entrance. Found also a few batches of recently deposited eggs. Separated these in another vivarium.

June 24, '92.—Large numbers of beetles are issuing; eggs are still very scarce. Beetles are feeding on leaves, eating small holes. There are still a few larvæ of the first generation.

June 25, '92.—There are still a few larvæ. Beetles have become quite numerous, though eggs are still very scarce.

June 27, '92.—Eggs are still scarce on the trees. Beetles in vivarium have deposited quite a number of eggs.

June 30, '92.—Beetles have become very numerous, and have almost ruined the leaves on one tree. The majority have now issued. They do not like to oviposit on the trees on which the leaves are nearly ruined, but eggs are now already quite numerous on all other trees, the foliage of which, so far, is but slightly injured.

July 2, '92.—Nearly all beetles have issued. Plenty of eggs have been deposited by them on some trees, so that often 5-7 egg-masses are deposited on one leaf. On other trees, on which the beetles are also plentiful, extremely few eggs can be found.

THIRD GENERATION OF BEETLES.

Eggs in vivaria, both those taken out doors and those obtained in breeding cage, are hatching.

July 8, '92.—A number of beetles died. No eggs deposited.

July 15, '92.—Beetles are getting very scarce.

July 18, '92.—Some of the larvæ in cages have changed to pupæ, just seventeen days since hatching of the eggs.

July 19, '92.—The oldest larvæ are already descending the trunk of the trees. There are still a few beetles to be seen, also quite a number of unhatched eggs, some of which have been but recently deposited; also larvæ in different stages, from the youngest to the oldest.

July 22, '92.—Larvæ are descending the trunks by thousands; large numbers are heaped up between tufts of grass, ready to change to pupæ. There are still some beetles on the trees; plenty of unhatched eggs and larvæ in all stages of growth. Badly infested trees look as if scorched by the sun; leaves are dropping.

July 26, '92.—Some trees are now almost bare of leaves, most of them having dropped. Larvæ of all sizes are running about on branches and trunks; those which are full-grown go to the ground to transform, all others are doomed to die of starvation. No more beetles to be seen. There are already plenty of pupæ and huge piles of larvæ around badly infested trees.

July 27, '92.—Beetles are issuing in vivarium ten days after changing to pupæ.

July 30, '92.—The first beetles of this third generation are issuing out doors. On some of the trees which yet have leaves there are still a considerable number of larvæ in different stages of development.

Aug. 1, '92.—Considerable numbers of beetles have issued to date, both out doors and in vivarium. Larvæ of all stages are still crawling about on trunk and branches Younger larvæ are still feeding on remaining leaves. Beetles are also feeding.

Aug. 3, '92.—Beetles are issuing in large numbers, and are migrating to the trees on which leaves are still present ; none to be seen on defoliated trees. There are still numbers of larvæ in the last two stages on some of the trees. Pupæ and larvæ are piled up under some of the worst infested trees to the depth of about one inch.

FOURTH GENERATION OF BEETLES.

Aug. 3, '92.—Found to-day out doors five small batches of eggs, which will produce the third generation of larvæ, and are doubtless deposited by beetles of the third generation. None are deposited so far in the vivarium. Large numbers of the lower layers of pupæ are dead and have commenced to rot, evidently on account of the recent rains and excessive heat.

Aug. 5, '92.—Beetles are swarming in large numbers, the air is full of them. There are still numerous pupæ and larvæ ready to change. Numbers of larvæ are still feeding ; most of them are about full grown. Eggs are still rather scarce. None have been deposited, so far, in the cages. There are now millions of beetles on the trees ; the remaining leaves will, therefore, be soon consumed. Eggs are still scarce, though batches of them are scattered over the trees; there is scarcely a chance for larvæ of the third generation to develop. There are still thousands of pupæ and also some larvæ of the second generation. Eggs found August 3rd have already hatched.

Aug 9, '92.—The majority of beetles have now issued. There are still a few larvæ. The denuded trees will soon have new leaves. Eggs are still scarce. Beetles in cages have commenced to deposit some eggs.

Aug. 11, '92.—Nearly all beetles have issued. There are still a few larvæ of second generation to be seen. Eggs (third generation) have become somewhat more numerous, especially on some young shoots, which are completely covered by the beetles. Leaves are appearing on some of the denuded trees.

ON DEMODEX FOLLICULORUM VAR. BOVIS IN AMERICAN CATTLE.—*

BY C. W. STILES, PH. D., WASHINGTON, D. C.

In most books which treat of *D. folliculorum*, considerable space is given to a description of the lesions it produces in man, dogs, cats and sheep, while its presence on cattle is simply mentioned with the remark that Claus and Gros state that it is occasionally found on these animals.

Gros seems to be the first who observed it on cattle. His original article is not at my disposal, but I quote from Blanchard.

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*See page 245.

Walter Faxon† added an interesting contribution to our knowledge on this subject, when he described some pits and pimples found in the skin of cattle and caused by the presence of the parasite in question. Faxon's paper seems to have remained unknown to most authors, while a few who have evidently seen it ignore it, with the remark that the description and figures are so poor that no confidence can be placed in it. Only a few authors have accepted his results.

While forced to admit that from a zoological standpoint Faxon's paper is not all that could be desired, I believe it should have received more attention than has been given to it, and I am now in position to support Faxon in his statements.

This past winter and spring Pfister and Vogel have sent to the Hon. Secretary Rusk several hides which were covered with "pimples" or pustules, and which, according to their letters, have been noticed occasionally in former years, but never in such alarming frequency as this year.

The hides were referred to me for examination, with the following result :—

They were dotted wlth numerous swellings about as large as a pea, and with numerous small punctures about the diameter of a pin.

Upon opening the swellings it was found that they contained a granular mass, which, owing to the preparation through which the hides had passed, was greatly changed histologically ; besides the granular substance there were immense numbers of *D. folliculorum* var. *bovis*. The parasites were easily recognizable, but were too macerated to warrant my giving figures of them in this note. The punctures were evidently the entrances to hair-follicles, while the lumen of the pimples evidently represented enlarged hair-follicles, the enlargement being due to the immense numbers of the parasitic mites present.

Dr. Michener requested Messrs. Pfister and Vogel to informs us in regard to the frequency of these pimples in hides which came through their hands, and received the following reply :—

"Milwaukee, Wis., April 28, 1892.

"Dr. C. B. Michener, Asst. Chief, Bureau of Animal Industry, Washington, D. C.:

"DEAR SIR,—Yours of the 22nd inst. received, and we are very thankful for the information you have furnished us. We have had such a variety of opinions on just what was the cause of these troubles that the result of your researches is very gratifying to us, as we were in the dark whether the cause was not some fault of ours in the manufacture of the leather. You asked at what time of the year this trouble appears. We have noticed it at all seasons, but had a remarkably large percentage of it in the hides received during the months of September, October, November and December of last year.

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†On the Presence of *Demodex folliculorum* in the skin of the Ox : Bulletin of the Museum of Comp. Zool. of Harvard College, Cambridge, Mass., 1878. Vol. 5, No. 2, p. 11–16. 1 Pl. with 9 figs.

"We have found it in hides that were bought in St. Paul, Chicago, Kansas City, but think we noticed it more in hides from the southern districts. The damage to the hide is a severe one, being fully 20 per cent. Taking 50 pounds as the average weight of country hides it would amount to 50 cents per head, which, of course, in the aggregate is an immense loss to the tanning interest.

"Yours very respectfully,
"(Signed) Pfister & Vogel Leather Co.,
"Per Fred Vogel, Jr., Mngr."

It will be seen from this letter that this parasite occurs on cattle much more frequently than has hitherto been supposed.

It would of course be extremely difficult to treat a herd of cattle affected with this parasite. Several authors recommended the same treatment for cattle which is used in cases where dogs are affected with the same parasite. Prevention, however, can effect a great deal, and as soon as the mites are noticed on an animal, the latter should immediately be isolated from the herd.

Bureau of Animal Industry, Washington, D. C.,
July 1, 1892.

Postscript.—Prof. Riley in personal conversation with me suggested the use of kerosene emulsion to destroy these parasites. The emulsion is certainly worth trying, but I must confess I have not much confidence that it will prove as effectual against these mites as it has against other arthropode parasites. Experience has shown that nothing short of a thorough rubbing in of whatever is used (benzine, carbonate of potash, green soap and all the rest of the remedies recommended in various books) will destroy the hair-follicle mite.

In the discussion which followed the presentation of the paper before the Entomological Club, the other varieties of *Demodex* were mentioned, and at the request of several members of the Club I append below the measurements (in mm.) of the varieties in question [compiled from Meguin, Railliet, Neumann, Zürn].

1. D. f. var. *hominis.*

Female:	length	0.40
	rostrum	0.02 long, base 0.03 broad.
	thorax	0.09 by 0.04

Male: length 0.30

rostrum, same as in female.

thorax .... 0.085 by 0.04

First larva (apode): .... 0.06 by 0.04

Second larva (apode) .... 0.08 by 0.06

Hexapode larva: .... 0.12 by 0.05

Octopode larva: .... 0.36 long.

Ovum: .... 0.06–0.08 by 0.04–0.05

rostrum + cephalothorax = one-third to one-fourth of the total length of the body.

2. *D. f.* var. *canis.*

Female: length 0.25–0.30

rostrum .... 0.03 long, base 0.03 broad.

thorax .... 0.10 by 0.045

Male: length 0.22–0.25

rostrum same as in female.

thorax .... 0.095 by 0.045

First larva (apode): .... 0.06–0.09 by 0.015–0.025

Hexapode larva: .... 0.11 by 0.032

Octopode nymph: .... 0.19 by 0.04

Ovum: .... 0.07–0.09 by 0.025

rostrum + cephalothorax = slightly less than one-half of the total length of the body.

3. *D. f.* var. *cati:*

Similar to var. *canis*, but one-fourth smaller.

4. *D. f.* var. *caprae.*

Female: .... 0.23–0.25 by 0.06–0.065

Male: .... 0.22–0.23 by 0.05–0.055

Ovum: .... 0.068–0.08 by 0.032–0.045

rostrum + cephalothorax = nearly one-half of the total length.

Causes a disease in goats similar to that described above in cattle (Nocard, Railliet).

5. *D. f.* var. *ovis.*

Said to differ from var. *hominis* in having a broader rostrum and cephalothorax (Oschatz).

6. *D. f.* var. *equi.*

E. Wilson says it is identical with var. *hominis.*

7. *D. f.* var. *bovis.*

length 0.2

The material in my possession at present does not warrant my giving exact measurements. Faxon's figures show that the abdomen is shorter and broader than that of var. *hominis*, and slightly less than two-thirds of the entire length. The form is more like that of var. *canis*, and I should not be at all surprised if a study of fresh material would result in the conclusion that var. *bovis* is simply a diminutive form of var. *canis*, and that the cattle originally became infected from contact with dogs. This is, however, mere speculation.

8. D. f. var. *suis*=*D. phylloides*, Csokor, 1878.

Female :	0.24–0.26 by 0.06–0.066
Male :	0.22 by 0.05–0.057
Hexapode larva :	0.13–0.14 long.
Octopode larva :	0.22–0.28 long.
Ovum :	0.10–0.11 by 0.034

rostrum + cephalothorax=about one-half the length of the body.

As I stated in the discussion, in answer to a question, this form is totally different from var. *bovis*, having an extremely pointed abdomen. It is so different, in fact, that Csokor described it as a new species; most authors admit it only as a variety. Personally, however, I rather incline towards Csokor's opinion.

NOTES ON THE BEAN WEEVIL.*

Professor Riley gave some verbal notes on the above subject, covering substantially the facts in articles recently published in the *Canadian Entomologist*, and an editorial prepared for the first number of Volume V., *Insect Life*.† Both the Bean Weevil and the Pea Weevil were found to have temporary thoracic legs of a peculiar form in the post-embryonic larval state, and also certain prominent spines on the prothoracic shield. The eggs of the Bean Weevil in the field are not attached to the outside of the pod, as had hitherto been stated and believed, but are laid in masses within the pod, through an aperture made by the jaws. In the green pods this aperture must frequently close up, so as not to be noticeable, as pods which were brought in from the field showing no trace of puncture gave out large numbers of Weevils, but in the drier pods the aperture remains and often takes the form of an elongate slit along the ventral suture. More often, however, the eggs are thrust into the more mature pods through the natural opening, as the pods dehisce. In reference to nomenclature, Professor Riley confirmed the position he had taken in 1870 that our Bean Weevil is not *Bruchus obsoletus* Say, this species having been rediscovered by Mr. Schwarz on *Tephrosia virginiana*. Our Bean Weevil, he concluded, must be known in future as *Bruchus obtectus* Say.

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*See page 255.

†Canadian Entomologist, August, 1892, Vol. XXIV., No. 7, p. 185.
Insect Life, Vol. V., No. 1, p. 27.

AN ADDITIONAL NOTE ON THE BEAN WEEVIL.

BY C. V. RILEY, PH. D.

In the note on the post-embryonic larvæ of the Pea and Bean Weevils, published in the August number of the *Canadian Entomologist*, (p. 185), I have stated that the eggs of the Bean Weevil "are primarily laid upon the bean pod in the field, but chiefly, if not entirely, upon those which are already matured and ripening." This statement was based upon the finding of the eggs upon more mature bean pods in years gone by, and represents the current belief hitherto held. A more careful examination of the eggs thus found the present season, after the note above referred to had been sent to the editor, showed that they did not entirely agree with the eggs of the Bean Weevil as laid on stored beans, the difference being sufficient to justify a doubt as to the former being those of the ordinary Bean Weevil, and to cause me to look into the matter more fully, which I have done in my own garden the past summer. The facts resulting have been recorded in *Insect Life*, Vol. V., No. 1, page 32, and they show that the eggs hitherto taken for those of the common Bean Weevil are, without much question, those of another Bruchus, either *Bruchus quadrimaculatus* Fab. or *B. scutellaris*, both of which infest beans. The eggs of our common Bean Weevil (*Bruchus obtectus* Say) are thrust into an aperture made by the jaws of the parent Weevil, generally along the ventral suture near the funiculus, or else are laid in clusters on the inside of the pod, wherever this is sufficiently ripe to cause a partial opening. In the field the aperture must be made early enough to permit more or less perfect closing by growth of the pod; whereas on mature pods it is often quite elongate and does not close.

I have also shown, in the article above alluded to, that our Bean Weevil should be known in the future as *Bruchus obtectus* Say, and not as *B. obsoletus* (Say) Horn, Mr. E. A. Schwarz having obtained what agrees entirely with the description of *obsoletus* upon *Tephrosia virginiana* in connection with *Apion segnipes*, which was also found upon the same plant (Say having found the two species associated on the same Astragalus), while the description of *obtectus* Say, so far as it goes, agrees very well with our Bean Weevil, that of *obsoletus* not agreeing, as was shown in my Third Report on the Insects of Missouri (1870). The synonymy of the species, chronologically, would stand thus:

1831—Bruchus obtectus Say.
1833—Bruchus leguminarius (Chevrolat) Gyll.
1839—Bruchus irresectus (Schönherr) Fahræus.
1839—Bruchus pallidipes (Chevrolat) Fahræus.
1854—Bruchus subellipticus Wollaston.
1861—Bruchus fabæ Fitch.
1867—Bruchus breweri Crotch.
1871—Bruchus fabæ Riley.
1873—Bruchus obsoletus (Say) Horn.
1889—Bruchus subarmatus Janson (?=subarmatus Gyll.).

FENISECA TARQUINIUS.

Mr. S. H. Scudder, in his "Butterflies of Eastern U. S." states that "*Feniseca Tarquinius*" has never been captured east of the Connecticut Valley in Massachusetts. Other writers mention it as rare in New England. It may interest some of your readers to know that I found it *very common* on the Glen Road near Jackson, N. H., in the second week in June. I also found a specimen on a window of the Boston Athletic Club, which seems a strange place for it. The building is on new made land, nowhere near any alder growth, in fact, in the city. I have collected a number of years in the suburbs of Boston, but have never seen a specimen.

Chestnut Hill, Mass. A. G. Weeks, Jr.

Mailed November 5th.

The Canadian Entomologist.

VOL. XXIV. LONDON, DECEMBER, 1892. No. 12.

NOTES ON COLEOPTERA—No. XI.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Baptolinus pilicornis, Payk.

Till lately this species has been known in our literature as *B. macrocephalus*, Nord. It has a very wide distribution across the northern part of the continent, from Alaska to New Hampshire, and through the Alleghanies as far south as southern Pennsylvania, and probably much further. In Europe it ascends to 68°, and is spread over all Siberia to the Amur. It does not seem to be abundant anywhere. It is very variable in colour, and to some extent in the fineness or coarseness of the general punctuation. I took two examples here recently under the bark of a moss-covered decaying oak, and several a few days afterward on the mountains, in the same situation. All these are black and shining, with the mouth parts, antennæ and legs pale, corresponding to the description of Paykull's type. Four examples from Vermont have the mouth parts and the antennæ rufous, and the elytra rufous, grading imperceptibly to rufo-piceous at the apex and sides. One example from Prince of Wales Island, Alaska, seemingly mature, is altogether pallid, except that the last abdominal segment and the outer hind angles of the elytra are fuscous, the general punctuation exceedingly fine, and the length only .15 inch (normal .20-.25 inch). *B. macrocephalus*, Nord., which occurs at Sitkha, is still different as described by Mannerheim, who says it has three punctures on each side of the thorax, whereas those above mentioned have but two. In Europe there are two other species listed, though by what characters they are separated I am not aware, but they are certainly very close to *pilicornis*. One of these, according to Mr. A. Fauvel (Rev. Entomolog. V. 117), *B. longipennis*, Fauv., occurs in Canada and New York, and inasmuch as he does not mention *B. pilicornis* as American, it is not improbable both species are confounded here, and perhaps *affinis*, Payk., which is as widely distributed in Europe and Asia as *pilicornis*. The thorax in *pilicornis* is exceedingly smooth and polished, with two minute setiferous punctures on each side—one near the anterior angle, and the other near the middle of the disk ; and here is a difficulty in referring it to the proper genus by the classification, in which it is said the thorax in the *Xantholinini* has "rows of punctures, of which the outer ones are curved."

Lathrobium armatum, Say.

Like the foregoing, this species varies greatly in coloration, which seems to be racial. Say described it from an example taken in Indiana, which had the elytra entirely dark, as have my examples from Illinois. As it occurs here, the apical half of the elytra is rufous, and no typically coloured example has been taken, though the individuals are numerous, inhabiting with mosquitos certain damp alluvial places overgrown by rank vegetation. The colour of the legs in both forms is usually bright rufous, that of the antennæ ferrugineous to brown, and the ♂ sexual characters are identical. The species likewise occurs in Ohio, West Virginia, Wisconsin, Michigan and Canada.

Bledius ferrugineus, Lec.

Is found along streams in wet, loamy places inhabited by *Heterocerus* and other mud insects. If it forms any galleries they cannot be distinguished from those of the other occupants ; pouring water on such places will frequently induce them to appear on the surface. The variety which occurs here is the typical, as described by Dr. Leconte, which has a shining black head and thorax, and the elytra bright ferrugineous, with the suture and scutellar region piceous. Length, .18 to .23 inch.

Bledius stabilis, Casey.

This species when found is abundant ; it lives in moist, grassy, compacted places on the banks of streams, and frequently at some distance from water. Its presence may be known by the surface galleries it constructs for a habitation. The individuals vary in the colour of the elytra about equally from piceous-red (perhaps from immaturity) to piceous-black, and average about .15 inch in length. July and August.

B. emarginatus, Say.

This beautiful little Bledius occurs everywhere in countless multitudes on damp, loamy places along streams near running water in July and August. These and an occasional example of *annularis* are the only species of the genus which have been observed here as yet ; with *emarginatus* occurs, but less abundantly, the minute *Trogophlœus uniformis*, Leconte, about .05 inch in length, and dark coloured throughout. It constructs surface galleries, and behaves like the preceding. Having no, or scarcely visible, dorsal thoracic impressions, it strongly resembles, a small *Bledius*.

It is closely allied to *T. convexulus*, Lec., a salt-marsh species of the Atlantic coast, which has the same habits. *T. decoloratus*, Casey, is the species of this genus next in abundance here, and is likewise minute, being from .06 to .08 inch in length. It inhabits very wet places along streams and swamps. It does not seem to construct galleries, but is sheltered by any kind of *debris* and the holes made by other mud insects. The most of the individuals have the elytra rufescent, with a dark shade near the base and suture, but occasionally one occurs in which they are piceous. The ♀♀ are very well described by Mr. Casey, and his description of *T. incertus* seems to apply quite well to the ♂♂, which have the head parts more developed. *Incertus* in that case will, according to custom, be the name of the species.

T. spretus, Casey,

Is found with the preceding, appearing to have the same habits, but is much less abundant. It is piceous, with pale legs, and about .11 inch in length.

T. quadripunctatus, Casey (?) Say.

This species is found with the preceding two. It is much larger than *spretus*, and less abundant. Examples of this species may have been formerly distributed as *memnonius* from a bought and wrongly named type.

T. congener, Casey,

Has the habits of the preceding, with which it is found. Only a few examples have yet occurred. It is entirely piceous, about .10 inch in length, and is readily known by the thorax being quite convex, and the dorsal impressions uninterrupted. The foregoing are all the species of this genus detected here as yet, but the exploration can not be considered exhaustive. The collecting and studying of these minute insects in one's local fauna will be found quite fascinating when rightly set about.

Eleusis nigrellus, Lec.

Two examples were taken under the bark of maple, June 15th, identical with others from California.

Siagonum punctatum, Lec.

Many examples were taken with the above, and I have it from North Carolina and New Mexico; it also occurs in Arizona and British Columbia.

Corymbites caricinus, Germ., *lobatus*, Mann. (Bull. Mosc., 1843, 243), *telum*, Lec.

This species is characterized by having an elongated thorax rather densely and finely punctured above and below, with the hind angles produced and non-carinate ; the antennæ are elongate in the male, serrate in both sexes from the 2nd joint, the 3rd and 4th being subequal. My examples from Queen Charlotte and Vancouver Islands are dull black, and no colour variations are recorded. Unalaschka, Oregon.

C. umbricola, Esch., Mann. (Bull. Mosc., 1843, 242).

This species in some way has become a synonym of *caricinus*, which it resembles by its elongate thorax and parallel form ; but here the likeness ceases. The thorax is more coarsely and sparingly punctured above and below, though somewhat densely on the sides above ; the hind angles are produced divaricately to a point, and are finely, conspicuously carinate, and blood red. The antennæ (males only seen) are elongate and serrate from the 2nd joint, the 3rd being notably longer than the 4th. All the examples seen are shining black, with a metallic lustre, and only one colour variation is recorded in which the hind angles of the thorax are fuscous. Sitkha, British Columbia. My examples are from Queen Charlotte Island.

C. lobatus, Esch.

This species has been placed in synonymy with *caricinus*, evidently by oversight, because in his comparison (Bul. Mosc., 1846,) Mannerheim distinctly states that *lobatus* has the hind thoracic angles carinate. I have seen no examples of *lobatus* with which to compare *umbricola*, but Mannerheim gives so many points of difference that it is not obvious why they should be united ; both were described at the same time and on the same page. Mannerheim gives six colour variations for this species, and the distribution Unalaschka, the island of Kadjak, the peninsula of Kenai, and the island of Sitkha.

Tragosoma depsarium, Linn., *Harrisii*, Lec.

The European and American forms are here united, for reasons which will appear. An example was taken in this locality this season ; it is widely distribted across the northern part of the continent, from Newfoundland to Vancouver Island, and through the Rocky Mountains into New Mexico. The punctuation of the thorax is much denser and finer in examples from Canada and the Rocky Mountains, than in those from the Pacific coast, in many of which the punctures are well separated. Each puncture supports a hair, and, curiously enough, the finer the punctures, the longer are the hairs, so that the Pacific coast females, with comparative sparse punctuation, are not conspicuously hairy. European examples are before me which are in no way distinguishable from those taken on the Pacific coast. To what extent individuals vary in Europe is unknown, but, regardless of sex or locality, there is much variation here. The following observations are made from a study of about 30 examples from Canada, Custer and Conejos counties, Colo.; Las Vegas Hot Springs, New Mexico, and various places on the Pacific coast, namely: The eyes are not uniform in size, depth of emargination, nor distance apart either above or below; the same joints of the antennæ are not always of the same length, and their united length is much greater in some individuals than in others; the antennæ differ also in the degrees of compression, coarseness, fineness and density of punctuation, while in some examples the outer joints seem glabrous; in others there is an evident microscopic pubescence; the thorax is variable in every way, and in few examples is there more than an approximation in every respect; the degree of angulation of the sides of the thorax varies from very strongly defined to scarcely any, and in some examples the angular point is before the middle in others behind it, while in the majority it is about the middle of the margin; the thoracic spine at the angle may be small or large, obliquely vertical, or sometimes directed anteriorly or posteriorly; the margin of the thorax behind the spine is narrowed in some individuals by a straight line, till it meets the margin of the base in nearly a right angle; in others it is either sinuate or arcuately rounded, forming no angle at its conjunction with the base; the surface may be nearly equal with a dorsal channel, more or less deep, but usually it has many irregular inequalities; the punctuation varies from the exceedingly dense (almost granulate) and rather fine, to that which is sparser and coarser, with the punctures well separated. The scutellum is also variable, sometimes large and equilaterally triangular, and again transverse and rounded at apex. There are no well defined races. The species is widely distributed through eastern and western Siberia, the countries along the Amur, and the mountainous parts of Central Europe.

Another species of *Tragosoma*, in some American collections for many years, has lately been described by Mr. T. L. Casey, from the male, under the name *spiculum*; of this I have not seen the female, which is probably Mr. Casey's *pilosicornis*, in which case, if the locality is correct, this species extends from New Mexico to the coast range in southern California.

Hylotrupes litigiosus, Casey.

With some hesitation by the author, this species is created at the expense of *ligneus*, on the grounds of colour pattern, differences in the size and shape of the elytra and thorax, differences in the punctuation and pubescence of the elytra, and certain differences in the anterior and middle tarsi of the males. All these characters are evanescent when a large number of examples from all parts of the country are placed together. There are before me now about 20 from Massachusetts, New York, Canada, Colorado, New Mexico, and the Pacific coast, and I have examined lately perhaps twice that number. The coloration of the elytra amounts to nothing in this species; one example is unicolorous rufous, except a blotch at the side; another is entirely black except a narrow marginal and subsutural line before the middle, rufous: between these extremes there are all kinds of spottedness and fasciateness. The series in my collection disproves the validity of the next two characters, and need not be discussed. I have only a male of the proposed species, and while the anterior and middle tarsi are in it as described by Mr. Casey, yet some of the males with differently coloured elytra have nearly the same form of tarsi, and there does not seem to be uniformity nor constancy in this character. The name will do very well for a colour variety, and two more might be made in this species with equal propriety.

Psenocerus tristis, Casey.

Since the note on page 160 of this Vol., I have obtained an exactly typical example of *tristis*, in which there is scarcely a suspicion of the basal elytral tubercles, and also one of the *supernotatus* colour in which they are equally inconspicuous. Another black example has them as fully developed as any of the rufous individuals. Their synonymy is seemingly absolute.

Leptura serpentina, Casey *(l. c.)*.

The statement that this is a "valid species" must be reversed; fresh material from California and an inspection of other collections show it to be synonymous with *3-balteata*, Lec., which is somewhat variable in form and elytral ornamentation: the length of the antennæ in this species as well as in many other Cerambycides is variable; in one collection there is an example of *3-balteata* with one of the antennæ blackish and the other rufous, and in another an example with them partly dark and partly rufous. It is easy to pick out typical *3-balteata* and *serpentina*; but what about the intermediates?

Marolia (Dircaea) Holmbergii, Mann.

Three examples of this pretty little species from Queen Charlotte Island, British Columbia, are before me, which agree absolutely with Mannerheim's description. Dr. Leconte described *Hypulus fulminans* from Oregon in words so similar to Mannerheim's, that his description is entirely applicable to these examples, allowing for a little variation in the colouring of the tibiæ. As Dr. Leconte suggested, his species is probably the same as Mannerheim's, and a comparison of types seems scarcely necessary. (Bul. Mosc., 1852, 347; Proc. Acad. Phil., 1859, 284.) Mannerheim's type was a unique taken at Sitkha.

Cteniopus murrayi, Lec.

Andrimus is proposed by Mr. Casey for this and four other forms described by him as species, namely, *brunneus*, *concolor*, *nigrescens* and *convergens*. Lately came to hand one ♀ and five ♂ examples belonging to this genus, said to have been taken at one place near Jacksonville, Florida, which I would have referred without hesitation to *murrayi*, had it not been for Mr. Casey's paper. Using the characters he employs in the separation of his species, there should be three as valid as any of his, and neither of them *murrayi* nor Mr. Casey's species. One ♂ and its assumed ♀ are near *brunneus*, but not quite; two ♂'s approximate *concolor*, but there are points of difference; while the other two do not quite agree with the description of *murrayi*. Without discussing details, with these insects in hand, and a careful study of Mr. Casey's descriptions, the conclusion reached is that at least three of his species, and the three which it would otherwise be necessary to create, are all one, and that *murrayi*. The Cistelidæ is one of the degredational families in which great latitude must be allowed for individual structural variation, otherwise there will be an excessive and artificial multiplication of species.

Apion.—A species occurs here very abundantly in June on Vaccinium stamineum which seems to be undescribed, apparently belonging in section 4 of Smith's Synopsis; it may be known by its slender beak, shorter in the ♂, antennæ inserted near the base, with the first joint short and strongly clavate, the second one half its length, but not more slender; by the thorax short, scarcely narrowed anteriorly, closely moderately punctured, and with a circular impression at base more or less obvious, the humeri prominent, base of elytra wider than thorax, striæ deep and punctured, intervals convex, claws acutely appendiculate, a bunch of long yellow bristles between the middle coxæ, black, scarcely or not pubescent; length, .05 inch, It occurs with *Anthonomus corvinus*, and being of the same size and appearance, some care is requisite in their separation.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held in its rooms in Victoria Hall, London, on the 31st of August and the 1st of September, the President, Rev. Dr. Bethune, of Port Hope, occupying the chair. The reports of the Treasurer, Librarian and Curator, the Delegate to the Royal Society, the Council, the Botanical, Geological, Microscopical and Ornithological Sections, were read and approved. The President delivered his annual address, and several interesting papers were read. A number of rare and remarkable specimens were exhibited. Full reports, with all the papers and proceedings in detail, will be published in the forthcoming Annual Report to the Legislature.

The following gentlemen were elected officers for the ensuing year:—

President—W. Hague Harrington, Ottawa.

Vice-President—J. M. Denton, London.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors—Division 1—James Fletcher, F. L. S., F. R. S. C., Ottawa.
" 2—Rev. C. J. S. Bethune, F. R. S. C., Port Hope.
" 3—Gamble Geddes, Toronto.
" 4—A. H. Kilman, Ridgeway.
" 5—J. Dearness, London.

Librarian and Curator—J. Alston Moffat, London.

Editor of the Canadian Entomologist—Rev. C. J. S. Bethune, M.A., D.C.L., Port Hope.

Editing Committee—J. Fletcher, Ottawa; H. H. Lyman, Montreal Rev. T. W. Fyles, South Quebec; J. H. Bowman, London.

Delegate to the Royal Society—The President.

Auditors—J. H. Bowman and W. E. Saunders, London.

A PRELIMINARY GROUPING OF THE DESCRIBED SPECIES OF SAPROMYZA OF NORTH AMERICA, WITH ONE NEW SPECIES.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

The following is a purely provisional grouping of the described North American species of *Sapromyza*, made up from the descriptions alone. As such, it is offered for publication. The practical use of this kind of work does not need pointing out. It greatly facilitates the identification of species where the descriptions are scattered through various works. In the determination of the single new species described at the end of this paper, it was necessary to consult each description separately. It required but little additional labour to tabulate the leading points in the descriptions, thus relieving later students from the necessity of going through the same laborious process. It is only necessary to give a warning against using the table without consulting the descriptions. The references to the latter will be found in the Osten Sacken Catalogue.

PRELIMINARY TABLE OF N. A. SPECIES SO FAR DESCRIBED.

a Flavous, rust yellow or rufous species.
b Wings, without distinct markings (spots or fasciæ).
c Antennæ and palpi concolorous with rest of body.
d Face and body unspotted.
e Antennæ, palpi, and body flavous, wings lutescent .... BISPINA Lw. (Nebr.)
TENUISPINA Lw. (Nebr.)
ROTUNDICORNIS Lw. (Sitka.)
ee Antennæ and body pale honey-yellow, terminal antennal joint rounded; wings with a slight yellowish tinge................ CONNEXA Say. (Indiana)
eee Antennæ ferruginous, palpi golden ochreous, body yellow, wings yellowish; front honey-yellow .... SORDIDA Wd. (W. Indies)
eeee Antennæ and body fulvous, palpi yellow; wings clear.......... .... AMIDA Wlk. (Ga.)
dd Face with a black spot.
f Body unspotted, lutescent, opaque; wings yellowish-cinereous.... MACULA Lw. (Texas)

ff Abdomen with six and scutellum with two black spots, otherwise yellow.............. .... OCTOPUNCTA Wd. (W. Indies).

cc Antennæ concolorous, palpi black ; antennæ, body and wings honey-yellow.....................RESINOSA Wd. (Ga.)

ccc Antennæ and palpi black on apex.

g Ocellar area enveloped in a round black spot.

h Body pale yellow, wings clear; arista short plumose above and below................ ....VULGARIS Fitch (Atl. St.)

hh Body pale rufous, wings clear; arista long plumose above, short plumose below....... ....OCELLARIS n. sp. (New Mex.)

gg Ocellar area concolorous with rest of front; body flavous, wings dilute pallid to fuscous ; posterior segments of abdomen with black hind margins............ ....CINCTA Lw. (Cuba)

bb Wings with markings.

i Body not spotted or vittate.

j Antennæ, palpi, and body flavous ; wings lutescent with spots................FRATERNA Lw. (Pa.)

jj Antennæ, palpi, and body flavescent ; wings lutescent, except markings .....COMPEDITA Lw. (Pa.)

jjj Antennæ and body pale yellow, wings spotted .. .. NOTATA Fallén (Eu. & N. A.)

jjjj Body pale yellow to rufous, wings spotted......... ..................PHILADELPHICA Mcq. (N. A.)

ii Either thorax, scuttellum, or abdomen with spots.

k Body pale honey yellow, scutellum with two black dots on hind border................ ....BIPUNCTATA Say (Mexico).

kk Body flavescent, with black spots ; wings fuscous, reticulate........DECORA Lw. (N. Y.)

iii Thorax and scutellum subfuscous vittate; body flavescent, except vittæ.............UMBROSA Lw. (D. C.)

aa Blackish or gray species, at most with abdomen more or less rufous.
l Wings unmarked.
m Body black, wings yellow......................
....LONGIPENNIS F. (Eu. & N. A.)
mm Body cinereous, opaque ; wings lutescent ....
.... QUADRILINEATA Lw. (Pa.)
mmm Thorax slate-colored, abdomen dilute rufous ; front
white fasciate ....LUPULINA F. (Eu. & N. A.)
ll Wings spotted.
Body opaque ; head, thorax, and scutellum cinereous, with black dots and spots ....
.... STICTICA Lw. (D. C.)

NOTE.—*Sapromyza apta*, Walker, is described from Mexico, in the Trans. Ent. Soc. Lond., new series, Vol. V., p. 321. I did not have access to this paper.

Sapromyza ocellaris, n. sp.

Yellowish rufous. Eyes brown ; face, front, cheeks, and occiput entirely light rufous yellow, except the slightly elongate round black spot on vertex enclosing the ocelli ; two pairs of ocellar bristles, the posterior pair decussate and very slightly directed backward, the anterior pair a little divergent and very strongly directed forward ; four frontal bristles on each side, posterior one on vertical margin near orbit directed backward, second one the longest and directed backward, as is also the next or third one, fourth or anterior bristle (partly broken off, but apparently) directed forward. Antennæ erect (*i. e.*, extended at right angle to plane of face), rufous yellow, the apical portion of third joint black, extending on outer lower edge nearly to base of joint ; first joint very small, third elongate, narrowed towards the end, about three times as long as second, second joint with some bristly hairs on lower anterior edge ; arista black, plumose on upper side, but only short hairy below. Proboscis yellow, palpi yellowish at base, but broadly black on tips. Thorax rufous yellow, with a few black posteriorly inclined bristles on dorsum, and with very short bristly black hairs ; scutellum concolorous with an apical non decussate pair of bristles, and a lateral bristle near base. Abdomen somewhat oval heart-shaped, strongly vaulted, fully as wide at base as thorax, short, rather sharply narrowed to apex, of a fulvous tinge, the anterior half of segments 2 to 4 of shining rufous-brown changeable to fulvous in oblique lights ; dorsum of abdomen with short black bristles, longer bristles on the posterior margin of each segment. Legs flavous, tarsi somewhat darker, front tibiæ slightly darker. Wings almost clear, with a very slight smoky tinge, wholly without spots, markings, or infuscations of cross-veins; halteres rufous yellow.

Length of body (including antennæ and with abdomen flexed), 3 mm.; of wing, 3½ mm.

Described from one specimen taken on foliage May 5, Las Cruces, New Mexico.

PRELIMINARY REMARKS ON SOME NORTH AMERICAN SPECIES OF HALISIDOTA HÜBN.

BY HARRISON G. DYAR, ROXBURY, MASS.

Mr. Neumoegen and myself are at work upon this genus, with a view to present a revision of it; there are, however, some points upon which I should like to make a few independent remarks. The genus Halisidota is exclusively American, its stronghold being in the South. Indeed, the whole sub-family, the Phægopterinæ, are strongly American, there being no European species and but few African, while still fewer reach through the East Indies to Australia.

HALISIDOTA (LOPHOCAMPA) MACULATA, Harris.

race *angulifera*, Walker.
race *agassizii*, Packard.

This species, *H. maculata*, presents three well-marked local races. The first named form is well known both in imago and larva, and extends in its range as far west as the Rocky Mountains. In the Sierra Nevada, the Cascade range, and throughout Western Oregon, Washington and British Columbia, its place is taken by the race *angulifera*, Walk. (= *alni*, Hy. Edw.) This race does not differ in the markings of the imago, and I do not think Western specimens can be distinguished from Eastern; but the larva is strikingly different. Mr. Hy. Edwards has described the most divergent form,* and this is found in the Sierra Nevada of California, and also, I believe, in Southern Oregon. But further to the North, the larvæ assume the black dorsal tufts of the typical form, though I have not seen any that could not be readily distinguished from *maculata*. It would be very instructive to trace *maculata* to the West, and *angulifera* to the East through Canada, to see whether the larvæ strictly intergrade.

In the coast region of California, that distinct climatic area which has so many endemic species, *angulifera* is replaced by the race *agassizii*, Pack.

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* Proc. Cal. Acad. Sci. VII. 129.

This is a very distinct race.[†] The moths are noticeably different, and can usually be readily picked out. The larvæ, too, differ from both the other races, being intermediate between the two. They are subject to a wonderful amount of variation, as I have elsewhere pointed out,[*] some examples closely approaching the larva of *maculata*, though the intermediate, typical form is quite different.

The above conclusions have been reached after breeding larvæ at various points on the Pacific Coast, and I have been assisted by information kindly given by Dr. H. H. Behr, of San Francisco, and by Prof. O. B. Johnson, of Seattle.

HALISIDOTA (LOPHOCAMPA) ARGENTATA, Packard.

race *sobrina*, Stretch.

race *subalpina*, French.

Almost strictly parallel to the preceding, *H. argentata* presents three local races. The Eastern one, *subalpina*, French, does not reach to the Atlantic States, nor probably even to the Mississippi Valley. It may be said to inhabit the Rocky Mountain region. Its larva is unknown, but the moth approaches *H. argentata* so closely, that I can find no distinguishing characters. The ground colour seems a little more yellowish, less densely covered with brown, but I doubt the constancy of this obscure character. Prof. French compares his moth with *H. scapularis*, Stretch (= *ingens* Hy Edw.), a very distinct insect, and I can only account for his failure to mention *argentata*, by the supposition that he did not possess specimens of it. If he had, it seems doubtful that this race would have ever received a name.

The race *argentata* proper inhabits the Sierra Nevada of California and the Pacific Northwest. It is abundant where found, its larva feeding on various coniferæ.

In the coast region of California we have, again, the most distinct race, *sobrina*, Stretch. Both moth and larva present perceptible differences. The white spots on the wings are smaller, and the brown ground colour more even and less irrorate, though the difference in coloration of the thoracic and abdominal parts as exhibited in Stretch's figure does not exist. The differences in the larvæ have been pointed out by Hy. Edwards, though he makes more of the slight differences than seems justifiable to me; they are not nearly so striking as his remarks would lead one to suppose. Moreover, the larvæ of *sobrina* are quite variable, some being darker, others lighter, as they occurred to me in some twenty-five examples at Monterey, Cal. I found but two larvæ of *argentata* at Portland, Or., both being dark in colour, with the yellow hairs reduced as described by Mr. Edwards, so that these characters seem fairly constant.

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[*] Psyche. VI. 323.

[†] Dr. Behr considers it to be a valid species, and there is much in favour of his view.

Halisidota (Halisidota) tesselaris, Abb. and Sm.

Halisidota (Halisidota) harrisii, Walsh.

I maintain the specific distinctness of these forms, though Mr. Neumoegen is unwilling to do so, because the moths cannot be superficially distinguished. They inhabit the same territory, so that we cannot have here to do with local races. I have verified the observations of Walsh, and shown some additional differences in the manner of growth of the larvæ.* The difference in the male genitalia gives additional weight to my conclusion, though I wish to examine more specimens before I can be sure that these differences are constant.

Halisidota (Zatrephes) trigona, Grote.

A specimen of this species, received from Dr. McKnight, shows that I have been mistaken in referring it as a synonym of *specularis* H. S. I am obliged to Mr. Grote for promptly pointing out the error. Mr. Neumoegen has written out, somewhat at length, the differences between the two species.

HALISIDOTA (AEMILIA) ROSEATA, Walker.

cinnamonea, Boisd.
significans, Hy. Edw.
sanguivenosa, Neum.

This pretty little species has proved a pit-fall to more than one describer, as witness the above synonymy. It has been unique in our fauna until the discovery of *H. occidentalis*. French has given us its close ally. The two differ only in coloration. *H. roseata* has a wide range, from Sonora (Boisduval) and New Mexico (Hy. Edwards) on the south, through California and the North-western States to British Columbia. Its larva is unknown, but it will probably prove to be a pine feeder.

Halisidota (?) macularia, Walk.†

This name awaits identification. It is referred to by Stretch,† but I cannot find it in Kirby's catalogue anywhere among the Phægopterinæ. The description reads like an Ecpantheria.

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* Psyche, VI. 162.

† Cat. Brit. Mus. XXXI. p. 314 (1864). † Ent. Amer. I. 107.

PARTIAL PREPARATORY STAGES OF CATOCALA ILLECTA, WALKER, WITH NOTES.

BY G. H. FRENCH, CARBONDALE, ILL.

Three days before the last moult, the larva is 1.30 inches ; after the last moult and three days before pupating, 2 inches. Nearly cylindrical, tapering from the middle to both ends, the under side a little flattened, a slight fold above the legs but no fringe on the sides. The markings in the two last stages are the same, except that the orange is a little heavier in the last stage. The ground colour of dorsum, sides, except below stigmata, and venter sordid white, below stigmata clear white ; striped transversely over the back as low as the stigmata, thus leaving a clear white substigmatal stripe, eight of these stripes and these somewhat double. some broken and others partly continuous ; a subdorsal and substigmatal row of orange patches, two of each row on each joint, the lower on each side of the stigma on the anterior part of the body, but on the posterior part these patches connect above the stigma, gradually passing from one form to the other ; on joint two, instead of two patches, the anterior half of the joint is orange with a row of black spots ; joints three and four with an irregular row of orange across near the middle of the joint. The fold above the legs black, with an orange spot on each joint ; the true legs orange with black tips, each with an obscure white stripe at the base ; the prolegs black and orange, with a white stripe at the base, anal legs orange ; anal plate orange with an anterior row of black spots ; the joint preceding this contains a somewhat zigzag transverse irregular orange stripe with black mottlings. Head olive, with four black longitudinal stripes to a side and one in the middle. Venter dull sordid white, rather dark ; the anterior joints, two to four, unspotted but striped transversely between the joints with black, the black and white lines going round the base of the legs ; joints five and six striped as above, even with the orange patches, but these paler than above ; joints seven to ten black between the legs and striped transversely between the joints with black and white ; joints eleven and twelve irregularly marked with black, as though the transverse black lines were broken into dots and dashes, an orange patch containing a black spot on each side of each joint, the orange connected with the orange on the lateral fold ; joint thirteen dull blackish ; each of the last three joints with blackish centres.

The chrysalis is 1 inch long, subcylindrical, slightly indented on the dorsum of the first abdominal joints, tongue and wing cases extending back to near the posterior part of joint five, tapering from five to the end, cremaster with two long hooks, two more about half as long from the tip, and several as long as the longer ones arising further back on the last joint. Anterior part rounded, abdominal joints punctured, other parts wrinkled. Brown, covered with a white powder, as in common with other species.

In pupating, leaves were fastened together with silk, the interior lined with a thin lining of silk to which the hooks of the cremaster were fastened. The food plant is honey locust. I have several times found the larvæ on low bushes of this tree.

In many respects this species is peculiar. In habits, it is one of the earliest, hatching the fore part of June in this latitude, after a pupal period of three weeks. I never found but one imago in the day-time and that was scared up from some raspberry bushes. I am of the opinion that it does not stay on trees in the day-time, as do most species, but hides among low bushes. I have not found the larva by whipping the limbs of trees, but on low bushes, and usually in such cases down in the grass, but on the stem of the food plant.

It is the only species I know that is striped transversely in the larval state; in fact, there is nothing in the markings of the larva that would lead one to suspect that it belonged to this genus. It is one of three species of which we have descriptions that has no lateral fringe. *Obscura* and *Innubens* being the other two. There are a few brief descriptions that are so imperfect that we cannot tell whether the larvæ were fringed along the sides or not.

The species in this country whose larvæ have lateral fringes are *Desperata*, *Retecta*, *Relicta*, *Amatrix*, *Cara*, *Concumbens*, *Unijuga*, *Stretchii*, *Parta*, *Ultronia*, *Ilia*, *Palæogama*, *Polygama*, *Cratægi* and *Minuta*. To this we may add the European species *Fraxini* and *Nupta*. This makes fifteen of our American species that are known to have fringe along the sides of the larvæ, and three that are known not to have. One feature about it is that according to our systems of classification the unfringed are mixed with the fringed. While this shows us that we do not know all about the affinities of the genus yet, still we know too little of the early stages to enable us to use it for classification. Some one has said we should place *Illecta* near *Concumbens* on account of similarity of markings, notwithstanding the dissimilarity of colour of hind wings. The above shows that the larvæ are as dissimilar as those of any species now known. At present it is well enough to let the lists be as they are.

DISCOVERY OF THE GENUS CRATÆPUS FÖRSTER IN AMERICA, AND THE DESCRIPTION OF A NEW SPECIES.

BY WM. H. ASHMEAD, WASHINGTON, D. C.

In 1878 Dr. Arnold Forster, in his "Kleine Monographie", erected many new genera in the family Chalcididæ that have been either overlooked by subsequent entomologists, or, at least, not included in any recent tables of the genera of this family, amongst which is a genus he calls *Cratæpus*, placed by him in the *Tetrastichoidæ*, and which I am pleased to announce also occurs in America.

The genus has only recently been recognized by me in a re-study of a minute chalcid sent to me some years ago by my Canadian friends, Messrs. James Fletcher and W. Hague Harrington, of Ottawa, who reared it from a Dipterous larva destroying the seeds of the "Canada Thistle" (*Cirsium arvense*, Scop.), and to which I gave the MS. name *Solenotus Fletcherii*, although at the time I felt satisfied it was improperly placed in this Thomsonian genus, as I wrote: "This species exhibits strong Tetrastichid affinities, and the genus, if properly recognized, may ultimately be assigned a position in that sub family."

It is a singular fact, and another illustration of the uniformity of habits of the species of a genus, that *Cratæpus aquisgranensis*, Förster, the type of the genus, and the only other species known, was reared by Förster from *Cirsium lanceolotum*.

The description of the Canadian species is as follows:—

Cratæpus Fletcherii, sp. n.

♀.—Length, 2 mm.; ovipositor half the length of the abdomen. Black, shining; sutures of trochanters, apex of femora, front tibiæ, except extreme tips, apex of middle tibiæ, hind tibiæ, except a blotch at the middle, and the basal joint of all tarsi, dark honey-yellow; rest of legs black. The front femora are lengthened and abnormally thickened, markedly contrasting with the slender and shorter middle femora, while the front tibiæ are remarkably short, and slightly dilated. The very short, black antennæ are inserted low down on the face, apparently only 7-jointed, but in reality 8-jointed, the terminal joint being very minute. Head transverse, a little wider than the collar, the face short; collar large transverse quadrate dorsally, obliquely declining towards the head; mesonotum somewhat broader than the collar, flat above, with two distinct furrows and a depression on its disk; scutellum broader than long with two grooved lines. Wings as in *Tetrastichus*, the nervures, except the submarginal, dark fuscous. Abdomen sessile, depressed above, boat-shaped beneath and terminating in a strong ovipositor that is fully half the length of the abdomen.

Hab.—Ottawa, Canada.

Bred by Fletcher and Harrington from Dipterous larvæ, destroying the seeds of *Cirsium arvense*, Scop.

CNICUS DISCOLOR AS AN INSECT TRAP.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

It is a well known fact that certain plants, as *Silene antirrhina*, L., and allied species, exude a sticky, viscid substance on stalk or peduncle for the purpose of preventing ants, small beetles, and other honey-loving intruders, which are too small to aid effectively in fertilization, from creeping up to the flower and robbing the honey-glands of their precious nectar. Other plants, as the Sundews, *Drosera rotundifolia*, L. etc., excrete a similar substance with which they attract insects, which are caught and afterwards utilized as food by the plant.

But no one, as far as the writer can ascertain, has called attention to the fact that one of our common thistles, *Cnicus discolor*, Gray, has along the middle of the outer surface of each of its involucral scales a large gland whose viscid secretion is poured forth in abundance and is especially attractive to certain species of insects. It is true that Dr. Gray in his Synoptical Flora, p. 402, mentions these glands and uses their presence or absence as characters to aid in the determination of species, but he says nothing of the substance which they secrete.

On various occasions in the autumn of 1891, numerous insects were observed by the writer crowded about the lower involucral scales of the thistle mentioned, where they were evidently attracted by the excretion there found. A closer examination always revealed that a number of the smaller ones were prisoners, their feet having become entangled in the viscid excretion, which had held them firmly, much as the pollen grains of *Asclepias* hold at times our common honey bee.

On Sept. 14 many flies and a number of specimens of a small green beetle, *Diabrotica longicornis*, Say, which feeds upon the pollen of the thistle flowers, were found thus entangled and were dead, as were also three specimens of *Phalangidæ*. A number of them were so dry as to crumble into powder when touched, showing that they had been prisoners for some time. On the same date as many as eight specimens of a much larger Scarabeid beetle, *Euphoria melancholica*, Gory, were found clustered at the base of a single head. Only one of them was in any way entangled, but all seemed in a dazed condition, as if intoxicated by the substance fed upon. A number of the same beetles were taken from a similar position on several occasions thereafter.

On Sept. 23rd about thirty small, black snout beetles (the genus unknown to me), three specimens of a small butterfly, *Pamphila huron*, Edw., more Phalangidæ, several ants, about twenty large *Hemiptera*, *Euschistus variolarius*, Beauv., together with a number of flies, were taken. Several of the snout beetles, the *Phalangidæ*, ants, flies, and one of the butterflies, were dead. All the others were easily captured with the fingers, being in the same dazed condition as the beetles above mentioned. The thistle heads whose bracts were most frequented by the insects were those in which the flowers had disappeared and the fruit was beginning to mature. Specimens of all the above-named insects were secured at intervals throughout October and until the plants were wholly deadened by the frost.

Of the use of the glands and their excretion to the plant I can give no explanation. They do not seem to serve, as do those of *Silene*, in keeping injurious insects from the flowers, nor does the plant appear to make any use of the insects which become prisoners.

NOTES ON THE HABITS OF *SIPHONOPHORA CUCURBITÆ*, MIDDLETON.

BY F. M. WEBSTER, WOOSTER, OHIO.

During the last days of August, Dr. Kellicott and myself, in studying the Squash borer, *Melittia ceto*, transplanted to a large breeding cage a number of roots and portions of the stems of Squash vines, on one of which was a leaf or two. The cage was filled with earth, dug up in the field, and when the vines were properly transplanted, the cage was covered with fine Swiss muslin, and placed in the Insectary. I soon noticed Siphonophora on the stumps of the vines, and before long there sprang up, from the soil in the cage, numbers of plants of *Capsella bursa-pastoris* and *Nepeta glechoma*. These plants soon became populated, the Squash having died out, and, November 4, I took from these, apterous oviparous females pairing with winged males and, also, apterous and winged viviparous females. None of these, however, could be specifically determined by Dr. Riley and his assistants. November 23 there were still many of the egg-laying females and males to be found, and a great number of eggs scattered about over the plants. The oviparous female is very robust, body green ; eyes brown and coarsely granulated ; antennæ, except first two joints (the bases only of which are black), tip of beak, feet, tips of honey tubes, black ; tips of femora and tibiæ, dusky ; honey tubes reaching half the length of tail, slender.

The males were light-bodied, with the wing much longer proportionally than in the winged females ; black, with margins of abdomen greenish ; wing veins dusky ; bases of wings very light yellowish ; antennæ very dark brown at base, the remaining portion nearly black ; eyes brown ; anterior femora very light at base and darker toward extremity ; middle and posterior femora with less light colour at bases ; tibiæ very dark brown, nearly black ; tarsi black ; honey tubes long, slender, piceous, darker at base.

The eggs were at first of a glassy green colour, but turned to black after being deposited a short time ; a little more than twice as long as broad, and appeared to be slightly stuck to the leaves of the plants.

During the following March these eggs gradually disappeared, and the plants again became populated with *Siphonophora*, but specimens sent to Washington were not determinable, except as to genera, and all were wingless viviparous females.

Strongly suspecting that I was dealing with the same species as had been brought into the cage on the Squash, there having been no way by which this could have escaped or another species entered, early in April I planted a number of Squash seeds in the cage. As soon as the young plants appeared they were at once attacked by apterous viviparous females, and on April 18th I secured winged females. On forwarding these to Washington, my own determination of the species as *S. cucurbitæ* was promptly verified. In this case, the environment was, of course, unnatural, and the insects were obliged to use these two species of plants in passing through their cycle, and hence they might find more congenial host plants in the fields ; but it seems to me that it would be safe to assume that the melon-louse can readily pass from its summer food plant to either one or both of these, and from them give origin to winged viviparous females in the spring, to return to the original host plant.

BUTTERFLIES ON GRANDFATHER MOUNTAIN, NORTH CAROLINA.

BY THEODORE L. MEAD, OVIEDO, FLORIDA.

Grandfather Mountain is one of a group of mountains rising to a height of over 6000 feet, in Western North Carolina and Eastern Tennessee, and forming the topmost crest of the Alleghanies. The rocks are chiefly granitic, and the crags and peaks naturally of a grayish cast, but rendered more sombre by innumerable blackish foliaceous lichens (Umbilicaria sps). At the bases of the summit crags the forest begins; black spruces and balsam firs, alternating with open meadow-like fields of the sand myrtle (Leiophyllum buxifolium), characterize the upper levels, and enormous hemlocks from 5000 feet down; but everywhere is a wealth of magnificent deciduous trees that can hardly be matched elsewhere on this continent. Flowers are abundant all summer long, and the native grasses are supplemented by cleared fields upon the mountain sides and in the valleys, where grass is grown for hay and pasturage. The whole region one would suppose to be a paradise for mountain butterflies, and especially Satyridæ, which are well represented in the foothills and lower valleys of the Alleghanies.

To my surprise, I did not see a single Satyrid of any species during my stay, July to September, either at Linville (3,800 feet) or at any higher point.

The butterflies were in general of northern type, and with rare exceptions were far more characteristic of Ontario than of the Carolinas. A single *Argynnis Diana* was the only suggestion of the rich butterfly fauna of West Virginia to the north of us, while the only Grapta was *Faunus*, abundant all along the roadsides from 4000 to 5000 feet elevation. Although this colony of *Faunus* must have been isolated from the great body of the species for thousands of years--perhaps since the receding ice of the glacial epoch, the butterflies in no way differ from those found in the Catskills and elsewhere.

The other common butterflies of this region are Papilio Troilus, Philenor and Turnus, with occasionally a black female Glaucus; Colias Philodice flying with about one fifth of its number of Keewaydin and Eurytheme, which are very variable and show all manner of intergrades; Terias Lisa, Danais Archippus, Argynnis Aphrodite, the females of which with worn males, abound on flowers of fireweed *(Erechthites)*, and a *Liatris*, in mountain meadows at 5000 feet and over in August, appearing in numbers about two weeks later at 4000 feet. A. Cybele, however, is rare, and I saw only a single specimen, which was smaller than the associated Aphrodites, although Cybele is represented by really huge examples in the warmer valleys of Virginia. The single specimen of A. Diana was seen at 3800 feet, at which level E. Claudia is not uncommon. P. Tharos is found occasionally ; Pyrameis Atalanta and Huntera were seen on the topmost crags, as well as lower levels. Limenitis Ursula frequented the roads ; Thecla Humuli, Chrysophanus Americana, Lycæna Comyntas, with an occasional L. Pseudargiolus, represented the Lycænidæ ; and a few Hesperidæ were seen, but not collected.

The list is noteworthy, chiefly for the absence of nearly all the butterflies characteristic of the latitude, and of many others which one would expect to meet in so favourable a mountain region. It is possible that some of these missing species may be found in the early spring, when the mountains are said to be one blaze of colour with Azaleas and Rhododendrons and all manner of vernal blossoms. These butterflies may lay their eggs early—so that the larvæ may have the whole season to grow—and then disappear ; but this is mere conjecture, based on the well-attested abundance of early flowers of gay colours well suited for butterfly fertilization.

A NEW GENUS OF DIPTERA ALLIED TO RHAPHIOMIDAS.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

In the "West American Scientist" for January, 1891, I gave a brief description of *Rhaphiomidas acton* n. sp., comparing it with the only other described species, *R. episcopus* O. S. The description was drawn from a single male specimen now in the National Museum at Washington, but during the past season I was fortunate enough to capture four additional specimens of this species, three males and a female, all of them having been taken on the wing while hovering over flowers in the hottest part of the day, the time being the first week in July. The possession of these specimens permits me to make a few corrections to my published description. In profile, the lower edge of the third antennal joint is not conspicuously less convex than the upper edge, and the tip is provided with a minute tubercle (this may have been broken off in the type specimen) ; the three ocelli are shining, but sometimes lose their lustre in drying ; the relative length of the fifth, sixth and seventh abdominal segments, as compared with the third, varies greatly according to the amount of contracting in drying: when fully extended they together are much longer than the third; finally, the eyes in death are almost black. The proboscis varies in length from three to four and a-third times the length of the head. The sexes are essentially alike, both in colouring and in structure, with the exception, of course, of the sexual organs. The species will be readily recognized by the deep orange-yellow ground colour of the abdomen.

In both of the above species the palpi are cylindrical and reach halfway to the anterior oral margin, and the anal cell is closed and short petiolate.

My collection contains a single female specimen which in structure is identical with the above two species, except that the anal cell is wide open. A character so important as this necessitates the erection of a new genus, for which I propose the name of *Apomidas*, n. gen. As it is identical with *Rhaphiomidas*, except in having the anal cell wide open, no further characterizing of it will be required, and the species is as follows:—

Apomidas trochilus, n. sp., ♀.

Head, including the antennæ and palpi, reddish-yellow, occiput and proboscis black, the latter being three times as long as the head; pile of head white. Dorsum of thorax black, the four corners, hind margin and pleura, including the cone, reddish, the breast largely black; pile and bristles of thorax white. Scutellum reddish, the pile and bristles white. Abdomen and venter reddish and yellow, the pile white, that on the last three segments black and directed forward; circlet of twenty-four spines of last segment black. Legs reddish-yellow, the spines yellow, a few on the hind legs black. Wings hyaline, showing a faint milky tinge in certain lights, veins yellowish. Length, 33 m m. Merced Co., Cal. A single female, in midsummer.

CORRESPONDENCE.

MEETING OF THE ENTOMOLOGICAL CLUB.

Sir,—The Secretary's report of my remarks in the discussions held at the meetings of the Entomological Club at Rochester, as published in the October issue, is certainly better than such reports usually are when not revised by the author. The language, however, is hardly my own, and in some cases the expression is misleading. I would therefore beg space for the following emendations:—

Page 249, first paragraph, eleventh line, read: "Acceleration might ordinarily be expected, but this seems not to be the case with this species." At the end of this paragraph insert: "He fully expected, however, that further experience would show a tendency to a second brood at New Brunswick through exceptional individuals, just as there was a tendency to a third brood at Washington."

Page 249, fourth paragraph, read: "In reply to a question by Mr. Lintner, Mr. Riley stated that at Washington the greater part of the second brood of beetles doubtless hibernated, although some laid eggs for a third or even a fourth generation."

Page 250, fourth paragraph, for "species" read "race".

Page 261, next to last paragraph, my remarks refer to Xenos and not to Polistes, which is mentioned immediately above.

Page 262, first whole paragraph, read: "Mr. Riley stated that he knew of no other species of Thyridopteryx similar to *ephemeraeformis*, although this species differed much as to the character of the cases, especially those upon conifers when compared with deciduous trees."

C. V. Riley, Washington, D. C.

BARK-BEETLE DESTROYER.

Sir,—The Bark-beetle *Dendroctonus frontalis*, Linn., has of late years been committing great ravages among the conifers of the West Virginian forests. In order to offer some resistance to this creature, Mr. Andrew D. Hopkins, Entomologist of the Agricultural Experimental Station at Morgantown, W. Va., has hit upon the expedient of placing in its company an enemy in the European Bark-beetle Destroyer, *Clerus formicarius*, L. For this purpose, Mr. Hopkins recently visited Germany, and here, through considerable skill and good fortune, he secured valuable information concerning the conditions favourable to the existence of this useful insect. He has transported the larva of the Bark-beetle Destroyer at various stages of development, as well as the pupa and imago, to America, all in great quantities, and in a state of hibernation. There being reasonable hopes of by far the greater part arriving over there in a healthy condition, it will be possible next spring to begin the experiments of acclimatization.

Camillo F. Schaufuss,
Director of the Museum Ludwig Salvator, Meissen, Germany.

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